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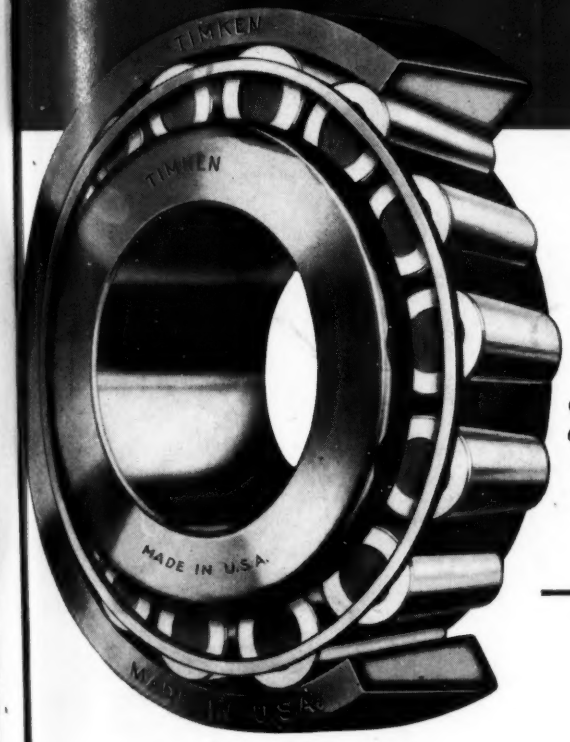

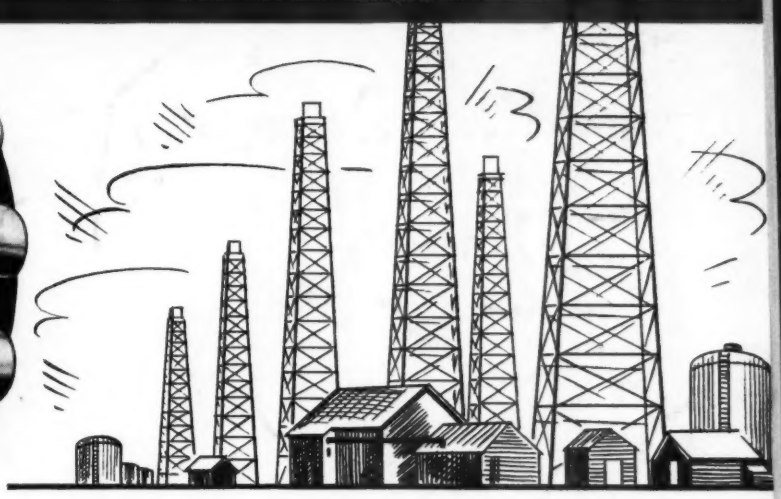

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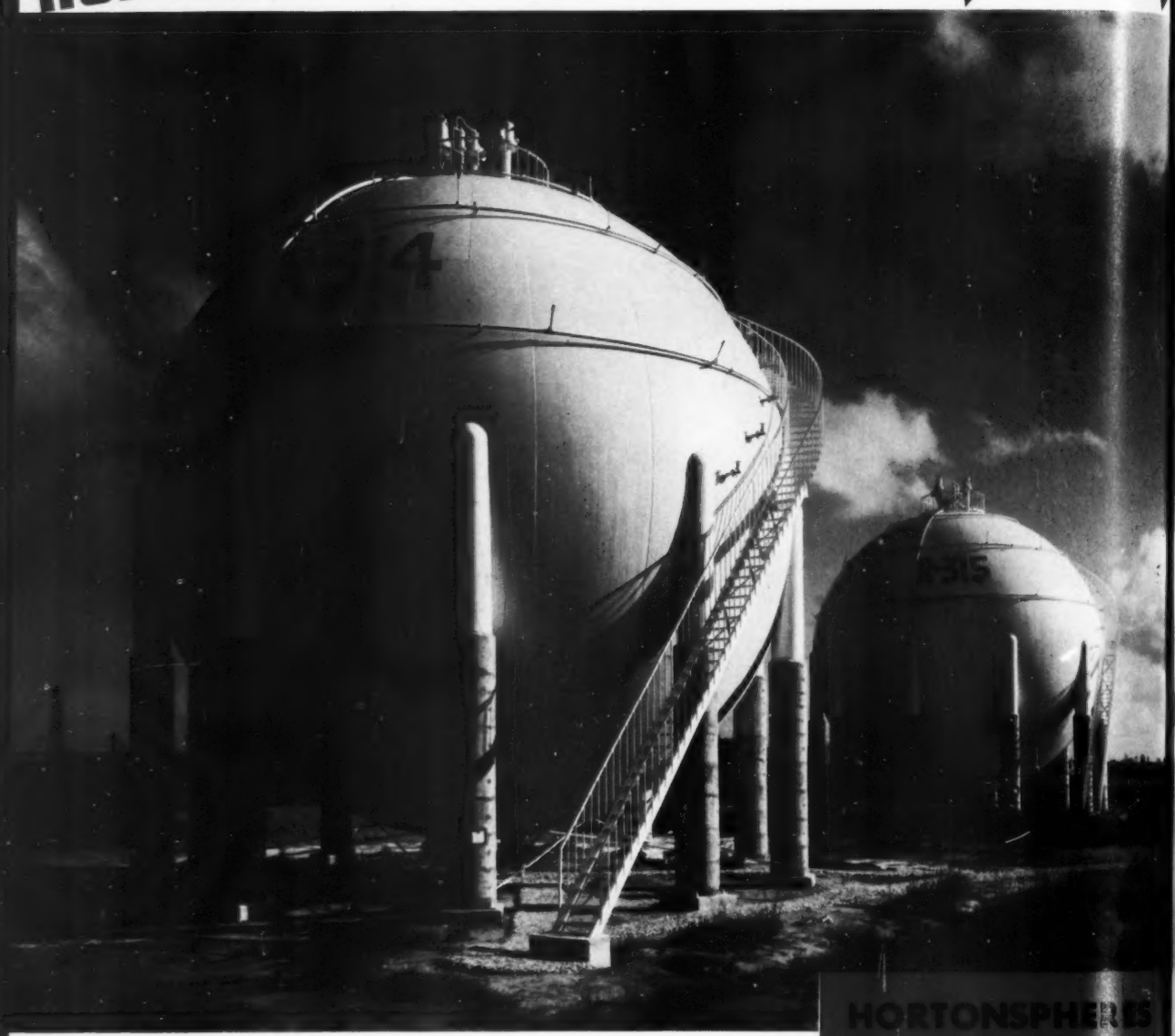

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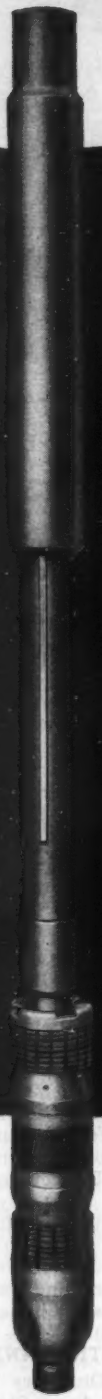

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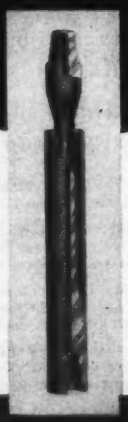

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As Regards Cooperatives

THE resolution adopted by the Western Petroleum Refiners Association directors should make clear the petroleum industry's attitude as regards the future operations of cooperatives. The broad position of the directors and the absence of personalities are reflected in the fact that the membership includes managers of cooperative refineries.

The association is not opposing the cooperatives per se. Cooperative publications and speakers always endeavor to develop one of their major promotional contentions that private business opposes them because they fear the cooperative methods of doing business. This is not the case. If there is something inherently right and strong in carrying on production and sales operations on a cooperative basis, oil men in all divisions of their industry will agree that a new economic order has been established.

All the W.P.R.A. directors are asking of federal and state legislators and the Internal Revenue Department is equality in tax payments. They rightfully insist that the cooperative filling station, bulk station, refinery, pipe line, and producing property should pay the same taxes as are paid by privately owned units operated in the same manner.

The cooperative contention that they distribute profits to members and the members pay the taxes does not hold water. In the first place, a large part of the nontaxed profits of cooperatives is not distributed to members as income but is used to finance expansion. Furthermore, what distribution does take place is in small driblets to individuals which, as income, are either tax free or come within the lower tax brackets.

The significance of these comparative tax positions first became generally apparent in the oil industry during the war period. Petroleum cooperatives, by largely avoiding the payment of normal and special war income taxes—paid in full by their private competitors as a legal and patriotic duty—grew fat and expanded rapidly in refining, distributing, and producing operations.

The cooperative development is particularly important to the small refiners, producers, and distributors who compete directly in every phase of their operations. Tax equality will necessitate the nullification of laws, starting more than two decades ago, which gave the cooperatives their privileged tax position. The house cleaning should also end the special banking arrangements and low interest rates.

Other oil-trade associations should join W.P.R.A. in insisting upon tax equality. They will be aided by small business everywhere which is just beginning to realize that it will be impossible for private enterprise to survive against their tax-favored competitors in a postwar period in which the tax burdens will be heavy for an indefinite period.

I.P.A.A. Forecasts 5 Per Cent Gain In Second-Quarter Demand

DEMAND for all oils during the second quarter of 1946 has been estimated at 5,550,000 bbl. daily by the supply and demand committee of the Independent Petroleum Association of America. The estimate represents a 5 per cent increase over the same period in 1946.

The forecast was made in an April supplement to the committee's January 1947 report. The supplement was to be distributed this week to the Interstate Oil Compact Commission, regulatory bodies in producing states, and the U. S. Bureau of Mines. A detailed analysis will be made in the committee's second quarter report to be released later this month.

The committee noted that consumption during March continued at high levels, indicating, it said, the largest volume in the history of the industry for the first quarter of the year. However, the committee declared a substantial reduction in imports will be necessary to bring total second-quarter supply in balance with demand if domestic crude production is maintained at its April rate of about 4,900,000 bbl. daily.

A domestic production of 4,790,000 bbl. daily would balance demand in the second quarter if imports are continued at the present "extremely high rate" of nearly 500,000 bbl. daily, considering the additional estimated domestic production of about 340,000 bbl. daily of natural gasoline and allied productions, the committee added.

Demand Up 10 Per Cent

"The demand for all oils during the past 3 months apparently was about 10 per cent larger, than during the same period of 1946 with gasoline up 8 per cent, kerosene 15 per cent, light fuel oils 25 per cent, and heavy fuel oils 8 per cent. These unexpected increases caused a net reduction in combined stocks of these products since the first of the year of about 30,000,000 bbl.—at least three times larger than the normal seasonal stock change for this period during prewar years," the committee said.

"With the ending of the winter months, a decrease in total demand for all oils from recent peak levels is to be expected as reductions in fuel oil consumption more than offset expansions in gasoline demand. This over-all reduction can be attributed entirely to seasonal factors and reflects the more important place that fuel oils have taken in the industry's operations. The effect of this drop in total demand on rates of crude production and refining, however, will be lessened by the need to begin rebuilding stocks of kerosene and fuel oils in anticipation of next winter's demand. It is estimated that at least 20,000,000 bbl. of kerosene, light and heavy fuel oils should be added to storage during the 3 months of April, May and June. During this same period, the probable seasonal liquidation of gasoline stocks is estimated at approximately 13,000,000 bbl. which would indicate a required net addition to stocks of the principal products over the 3 months of approximately 7,000,000 bbl., or 80,000 bbl. daily.

"Total consumptive demand for all oils during the second quarter of the year is estimated at 5,550,000 bbl. daily, about 5 per cent larger than the same period in 1946. With no change in crude stocks and with 80,000 bbl. daily estimated as required for seasonal additions to stocks of refined products, total new supply to balance demand and provide for proper stock levels over the 3-month period is estimated at 5,630,000 bbl. daily.

Hearings Open April 14 on Bill to Amend Natural Gas Act

WASHINGTON.—Federal Power Commission members, if asked to testify on the Rizley bill when hearings open April 14, are expected to ask Congress to delay legislation until the FPC completes its report in the natural-gas investigation, Docket G-580.

This line of approach apparently was set in the sections of the staff report issued so far. These reports have taken the position that there is no great need for speed in amending the Natural Gas Act, in spite of the industry's fears. The argument is that even if the trend of FPC decisions is as dangerous as critics believe, no one in the industry is being injured as yet, and the fears are all for the future.

On production and gathering, for instance, it will be argued that the case which so alarms the industry, that of the Interstate Natural Gas Co., is still pending before the Supreme Court for review and so has not yet become final. Even if this decision is upheld it affects only one company doing business under a peculiar set of circumstances not at all typical of the industry generally, so it does not necessarily follow that all production and gathering could be brought under FPC jurisdiction.

Similarly, FPC officials will point out, decisions which give the appearance that the commission is attempting to regulate industrial sales and "end use" of gas involve special sets of circumstances peculiar to the individual situations at hand, and that they neither set sweeping precedents nor indicate that FPC will move rapidly in that direction in the near future.

Furthermore, it will be argued, virtually every gas-transmission company is faced with a demand far in excess of capacity so that it will be buying all the gas that can be brought to its lines and curtailing service to industrial and even domestic consumers until new construction can be completed.

Therefore FPC will suggest that Congress postpone consideration of new legislation until the FPC staff reports have been completed, all interested parties have had ample time to study and comment on them, and the commission itself has digested all the material and published its final report. Since all chapters of the staff report may not be completed until the end of June, the final report is not expected until late in the fall, which would mean postponing congressional action until the session which begins next January.

Compact's Stripper-Well Committee to Meet

Don T. Andrus, chairman of the Interstate Oil Compact Commission's recently appointed stripper-well committee, has called the first meeting of the group April 14 in St. Louis.

Chairmen of similar committees previously appointed by the Independent Petroleum Association of America and the National Stripper Well Association have called their committees to meet with the compact group to coordinate the work. The compact committee is to make a thorough study of the nation's stripper-well reserves with special consideration to the practicability and feasibility of permanent incentive payments by government or industry.

Building Controls Transferred But Nonhousing Limit Remains

WASHINGTON.—Virtually all controls over building construction were transferred bodily from the Civilian Production Administration to the Office of the Housing Expediter on March 31 with the expiration of the Second War Powers Act, and the housing program is continuing with practically no change.

Nonhousing construction, such as refinery buildings and gasoline filling stations, is still strictly limited by permit, and is being held down to a total volume of $50,000,000 per week. Permits may be obtained only when need is shown under one of the familiar categories, such as personal hardship, community need, no interference with home construction, or to expand production facilities of a needed commodity.

CPA had intended to increase the weekly nonhousing limit to $75,000,000 in April if its authority had been continued, but Housing Expediter Frank R. Creedon intends to continue the old limit for the present. However, he has given assurance that the ceiling will be raised later and probably will be removed entirely before the end of this year, in spite of vigorous opposition from veterans organizations and others insistent on more home construction.

Construction experts in the Government are now inclining to the view that home construction alone will not long be able to absorb all building materials and construction labor which will be available, so other building will have to be stepped up to balance the construction industry's economy. Since large industrial-construction projects require months of preliminary planning, announcement of more liberal restrictions may be expected in the relatively near future.

Eminent Domain for Gas Pipe Lines Provided in Senate Bill

WASHINGTON.—A bill to give the power of eminent domain to natural-gas pipe-line companies has been introduced in the Senate jointly by senators Moore of Oklahoma, Stewart of Tennessee, O'Mahoney of Wyoming, and Connally of Texas.

The bill (H.R. 1028) would amend the Natural Gas Act by writing into it a provision identical with the eminent domain language of the Federal Power Act, which applies only to electric utilities. It would provide that when a natural-gas company has been granted a certificate by the Federal Power Commission to construct an interstate pipe line the company will have the right to condemn a right-of-way for purposes of fulfilling the terms of the certificate. Lack of such a provision in the Natural Gas Act was one of the subjects discussed during FPC's natural-gas investigation.

So far as can be learned, no natural-gas pipe line has been unable to obtain right-of-way by negotiation and purchase, but before the war some oil pipe-line companies found it impossible to cross railroad rights-of-way because of the opposition from these competing carriers, and such a situation might easily arise in connection with a new gas line.

A specific case where the proposed legislation would apply is in Pennsylvania where the Big Inch pipe-line easements across state-owned highways and river beds are for the transmission of oil only. If the new bill is enacted and FPC gives Texas Eastern Transmission Co. a certificate to move gas across Pennsylvania through the Big Inch system, Texas Eastern would have power to compel the state to give it an easement for gas also.

Export-Import Balance Advocated by Hardey

SOME balance must ultimately be worked out between exports and imports in the United States' petroleum trade, and the Independent Petroleum Association of America will "in due course" go before Congress with its recommendations, B. A. Hardey, Shreveport producer and association president, said in a talk April 3 at a Tulsa Chamber of Commerce luncheon.

The I.P.A.A. president declared imports should augment domestic production but not stagnate the domestic industry. It would, he said, be "foolish to ignore the vast reserves" of such foreign areas as the Middle East. Ultimately, he predicted, Persian Gulf oil will capture the European market.

Hardey referred critically to "some of those in Washington who would flood this country with foreign oil." He advocated a national oil policy which would foster the domestic industry and provide restrictions on imports consistent with this aim. Such a policy, he added, would support American nationals operating abroad to give the United States an auxiliary source of petroleum in case of an emergency.

Since the United States is now operating in a "high-level economy," the price of crude oil and consequently products must remain relatively high. "A crippled industry can't do a decent job," he said. Explaining the recent price advances, he pointed out the cost of basic production equipment has risen 92 per cent, wages 74 per cent, while the price of gasoline has increased only 17 per cent.

Mid-Continent Application Dismissed by Commission

WASHINGTON.—At the request of the company, the Federal Power Commission has dismissed Mid-Continent Gas Transmission Co.'s application to build a pipe-line system from southwestern Kansas to Kansas City and St. Paul.

The commission at the same time denied Mid-Continent's request to continue as an intervenor in proceedings before the commission involving proposals of Cities Service Gas Co. and Northern Natural Gas Co. for substantial expansions of their transmission systems. FPC said Mid-Continent had no "good cause" to continue as an intervenor with its application dismissed.

In requesting withdrawal of its application, Mid-Continent said it had been unable to secure firm commitments for adequate gas supplies previously indicated as available.

Plantation Extension Sold To Keystone for $492,940

The 180-mile Plantation Pipe Line Co. extension, built as a war measure to carry petroleum products from Greensboro, N. C., to Richmond, Va., has been sold to Keystone Pipe Line Co., Philadelphia, for $492,940 cash.

Keystone's bid of $477,000 was the highest of eight received for the line. This bid was rejected, and a counterproposal for a sale price of $492,940 then was accepted by the company, War Assets Administration announced in Washington. Keystone plans to relocate the line for use in connection with other company operations.

Three top officials of the Marketing Division, American Petroleum Institute, at the French Lick, Ind., meeting were B. L. Majewski, vice president in charge of marketing, Deep Rock Oil Corp., Chicago, and A.P.I. vice president for marketing; Harry J. Kennedy, vice president in charge of marketing, Continental Oil Co., Ponca City, Okla., new vice chairman of the general A.P.I. marketing committee; and Hugh L. Thatcher, Thatcher Oil Co., Chattanooga, Tenn., new committee secretary

A.P.I. Marketing Division Lays Plans for Expansion

FRENCH LICK, Ind.—Development of the Division of Marketing of the American Petroleum Institute into "a public forum for marketing problems" and "the medium of unifying the petroleum marketing industry of the United States," was asked by B. L. Majewski, Deep Rock Oil Corp., chairman of the general marketing committee, at the spring meeting of the division here April 1-2.

Majewski said the division should be "sufficiently representative of the marketing industry to get up on its hind legs and howl" and to "make its voice heard and respected in the legislative halls of both Congress and the states" when unjustified attacks are made on the industry.

The general committee voted to expand its membership to include all phases of petroleum marketing not now included, and to extend memberships to other than top-ranking executives.

In an address before the division, James H. Doolittle, vice president of Shell Union Oil Co., predicted there will be 400,000 registered aircraft and 1,500,000 licensed pilots by 1955, affording a tremendous new gasoline and motor-oil market.

Emphasizing the need for research, Charles S. Roberts, New York market expert, told the meeting the handling of the many new products being perfected by the petroleum industry will be profitable only if sound marketing research is applied.

A committee was named to determine whether the general committee should work toward adoption of uniform specifications of all types of fuels. The committee voted to increase the membership of the lubricating committee from 49 to 65 and approved the publication of an A.P.I. booklet on branded petroleum lubricants.

Nominated as marketing directors of the A.P.I. were Rex L. Kent, Kent Oil Co., Salina, Kans.; Don M. Dickey, president of the Northwest Petroleum Association, Minneapolis; Russell Williams, Independent Branded Petroleum Association, Indianapolis; and John Harper, Harper Oil Co., Long Island City, N. Y.

The group set the next meeting of the general marketing committee for Minneapolis on June 30-July 1. Attendance at the French Lick meeting was about 200, exceeding expectations.

Three States Fix April Allowables

April crude-oil allowables unchanged or slightly higher than March permissables have been set by regulatory bodies in Kansas, Arkansas, and New Mexico.

In Kansas, the Corporation Commission made the first change in allowable since July 1946, setting the April total at 275,000 bbl. daily, a 5,000-bbl. increase. Arkansas's Oil and Gas Commission announced April allowable figures totaling 88,758 bbl. daily, divided among controlled oil pools, 66,193 bbl.; controlled gas pools, 6,065 bbl., and unprorated pools, 16,500 bbl. In New Mexico, the state's allocation was continued at 112,000 bbl. daily. Substantial increases in April allowables over March previously were announced in Texas, Louisiana, and Oklahoma.

Compact to Discuss Oil Development, Use

OKLAHOMA CITY.—Ways of encouraging greater development and wider use of the nation's oil and gas resources will be discussed at the spring quarterly meeting of the Interstate Oil Compact Commission in Birmingham April 24-26, according to Chairman Hiram M. Dow.

Experiments in underground gasification of coal, now being conducted by Alabama Power Co. at Gorgas, Ala., will be reviewed by Dr. Milton H. Fies, a director of the company and consulting engineer in charge of the project.

Effects of conservation, resulting from proper laws and regulations, on oil and gas development will be outlined by Gov. Beauford H. Jester of Texas.

Half a day of the meeting will be devoted to a discussion of the Federal Power Commission's staff reports in its natural-gas investigation. Nelson Lee Smith, FPC chairman, and Harrington Wimberly, member, are expected to attend the meeting.

The economics advisory committee will meet 2 days prior to the general session to review the industry's statistical position and prepare reports on anticipated demand for petroleum and petroleum products. All other committees will meet during the morning of April 24.

Jester Signs Agreement To Extend Oil Compact

Texas became the twelfth state to agree to the extension of the Interstate Oil Compact Commission until 1951 with the signature of the agreement by Gov. Beauford Jester. Six other member states have yet to sign the agreement.

Secretary of Interior J. A. Krug announced in Washington the appointment of Max W. Ball, director of the Oil and Gas Division, as the compact's representative from the Department of the Interior.

Hearing Date Set

AUSTIN. — The Texas Railroad Commission has set April 15 as the date for a hearing on the application of Luling Oil & Gas Co. to inject gas into the Pettus sand through wells in South Burnell field, in Bee County.

this week

REFINING—Sohio reveals plans for $10,000,000 modernization program at Lima, Ohio, refinery. . . . New catalytic cracking unit of 6,000 bbl. daily capacity and other facilities planned. . . . ¶Cities Service reports work progressing on $18,000,000 program at East Chicago refinery. . . . Erection of tankage, building construction, and other work to get under way in summer. . . . ¶Mid-Continent Petroleum's annual report says arrangements complete for installation of catalytic cracking unit at Tulsa refinery as soon as materials and equipment are available. . . . ¶Materials shortages, high building costs force cutback of approximately a third in Dow Chemical's Gulf Coast construction program, originally estimated as involving $150,000,000 expenditures. . . .

PIPE LINES—Southern Natural Gas Co. files application with FPC asking authority to carry out a $50,000,000 expansion program. . . . New lines proposed would extend service into northern Florida, southern Georgia, and South Carolina. . . . ¶WAA closes sale of Plantation Pipe Line Co. extension to Keystone Pipe Line Co. for $492,940. . . . Line to be relocated in other areas. . . . ¶FPC dismisses Mid-Continent Gas Transmission's application for its Hugoton-Kansas City-St. Paul system. . . . Action taken at company's request which cited inability to secure firm gas-supply commitments. . . .

NATURAL GAS—House committee set to open hearings April 14 on Rizley bill to restrict jurisdiction of FPC. . . . Washington reports indicate commissioners will advance the argument that action on any amendments should be delayed since legislation involving the questions are still pending in the Supreme Court and because the FPC's own staff reports are not complete. . . . Walace Hawkins again attacks FPC, this time for claiming savings to consumers of $35,000,000 annually. . . . Hawkins asserts FPC's interpretations driving vast quantities of gas from the market. . . .

MARKETING—A.P.I. Marketing Division makes plans to expand membership and promote division activities at meeting at French Lick, Ind. . . . ¶Attorney-general tells Idaho senator who protested products prices in his state, that Department of Justice expects to file additional cases in near future to divorce major companies from control of filling stations. . . .

INTERNATIONAL—Chile's fifth Spring Hill test reported brought in as major gas well. . . . ¶Sinclair reports preparations now being made to commence drilling operations on its Ethiopian concession. . . . ¶Creole's February production listed at 599,192 bbl. daily, another all-time high. . . . ¶Preliminary work gets under way on right-of-way to Tropical Oil Co.'s 63-mile, 6-in. pipe line from Barrance Bermeja to Puerto Berrio. . . .

EXPLORATION—Stratton field, Nueces County, and La Gloria field, Jim Wells County, Texas, get new oil-zone discoveries. . . . ¶Successful tests in Throckmorton, Jack, and Coke counties give North Central Texas three discoveries. . . . ¶Grubb and Hawkins test in Wharton County flows 105 bbl. pipe-line oil daily. . . . ¶Continental's new field discovery in Live Oak County flows 22 bbl. condensate and 3,000,000 cu. ft. gas. . . . ¶Kingwood Oil Co. test in Noble County, Oklahoma, revives interest in Ceres area. . . .

Income from oil-producing property has been put to many and varied uses. Here it provided funds for the construction of this handsome brick church in southern Illinois. The Grand Prairie Christian church is at a crossroads south of Selmaville, Ill., in Salem pool. The property was developed by Ladd Oil Co. which brought in the first well in October 1938. The Texas Co. took over the lease early in 1946. Three of the four wells drilled are still producing from 8 to 10 bbl. daily (International News Photo)

Southern Natural Asks Approval Of $50,000,000 Expansion

WASHINGTON. — Two applications for authority to construct and operate additional natural-gas pipe lines to cost more than $50,000,000 have been filed by Southern Natural Gas Co. with the Federal Power Commission.

In the first application, Southern Natural asks authority to extend natural-gas service to northern Florida, southern Georgia, and into South Carolina.

The new markets would be reached by a 225-mile, 16-in. trunk line extending from a point on a proposed Gwinville-Atlanta line to Colfax, Ga., with extensions from the trunk line. The extensions would include 155 miles of 8⅝-in., 6⅝-in., and 4½-in. line to Tallahassee, Fla.; 165 miles of 10¾-in. and 8⅝-in. line to Jacksonville, Fla.; 54 miles of 10¾-in. line to Savannah, Ga.; and 182 miles of line to Georgetown, S. C. The project also includes five compressor stations with an aggregate of 31,600 hp. Cost of the projects in this application was estimated at $25,711,955.

In the other application, which replaces an earlier request, the company asks authority to add facilities increasing its capacity from 255,000,000 to 490,000,000 cu. ft. a day. Cost involved would be $24,533,350.

The added capacity, the request said, would supply increased demands in the territory now served, including new customers of distributors to which Southern Natural sells gas for resale.

To provide the increased service, the company would construct immediately about 18½ miles of main-line loop and 15½ miles of branch-line loop, and would install a total of 4,000 hp. in existing compressor stations.

During 1947 and 1948 the company's plans include construction of a 375-mile, 24-in. line from Gwinville gas field to Atlanta, Ga., and various extensions, including 33 miles of 12¾-in. loop line, 83 miles of 8⅝-in. line, 97 miles of 10¾-in. line, 29 miles of 6⅝-in. line, and 52½ miles of 4½-in. line.

The company said facilities to be installed during 1947 would increase the capacity of the system to 274,000,000 cu. ft. per day and completion of all facilities would increase delivery capacity of the lines to 490,000,000 cu. ft. per day.

Southern Natural said the requirements of present customers are expected to reach a peak of 393,780,000 cu. ft. a day by the winter of 1949-50, but that the excess capacity provided in the proposed construction program is justified by the fact that gas demands are following an upward trend, that days occur frequently that are colder than the temperature used in estimating demand, and that the future demand for gas may have been underestimated.

More Research Needed to Improve Diesels, Conference Is Told

THE large increase in the use of diesel equipment demands a large amount of research work, C. G. A. Rosen, director of Caterpillar Tractor Co., last week declared in Chicago before a session of the Midwest Power Conference, sponsored by the Illinois Institute of Technology.

Engine manufacturers and petroleum companies should cooperate in this research work, he declared. He called attention to the necessity for developing lubricants that will result in lower maintenance costs and stressed the need for burning lower-grade diesel fuels where they are available locally.

Efforts now are being made, he said, to improve the diesel engine to a point where a greater amount of power can be concentrated into small, compact units. Earth-moving equipment, particularly large, rubber-tired units, are demanding high horsepower and light weight, he said. Trucks, he added, are requiring increasingly greater horsepower to carry loads over steep mountain grades at speeds which justify the movement of freight on wheels.

While the present demand is for engines of 200 to 300 hp., the near future probably will see demand for 500-hp. units in small compact packages, he asserted.

In another session, Ralph A. Sherman, supervisor of the fuels division of Battelle Memorial Institute, Columbus, Ohio, predicted that fluid fuels synthesized from coal will attain increasing importance.

Proved petroleum and natural gas resources, he said, "appear to be great enough for only a relatively short period in the face of a continually increasing demand." Known resources of coal, he said, will supply present energy requirements for about 1,700 years.

Cost of fuels developed from coal will not be excessively high, he declared, adding that technological advances already indicate they will be able to compete successfully with products from petroleum.

Sherman said the keen competition between producers of fuels has led the various industries involved to carry on extensive research work, which has resulted in improved equipment.

Senators to Visit Saudi Arabia in Investigation

WASHINGTON. — Two, and perhaps three, members of the Senate war-investigating committee are planning to visit Saudi Arabia early next week in connection with the committee's investigation into prices paid by the Navy for Persian Gulf oil during the war.

Senators Owen Brewster and Homer Ferguson, according to associates here, plan to fly to the oil fields from Cairo at the close of the Interparliamentary Union meeting being attended by an 11-member congressional delegation, of which they are members. Sen. Carl A. Hatch is expected to accompany them if his schedule permits.

Texas School Board Gets Lease Renewal Authority

AUSTIN.—Legislation authorizing the School Land Board, composed of the governor, attorney general, and land commissioner, to renew oil leases on submerged lands, has been passed by the Texas Legislature.

The bill permits renewal at a bonus of not less than $2 and the same royalty to the state as in the original 25-year lease.

Texas Underproduction in February 6.98 Per Cent

AUSTIN.—Texas production in February totaled 57,796,978 bbl., according to figures of the Texas Railroad Commission.

The total was 4,338,880 bbl. below the February allowable, showing an average underproduction of 6.98 per cent. The percentage ranged from 1.89 in East Texas to as high as 19.53 in North Texas fields.

Public Relations Requires Industry Understanding, Arnett Says

"A SUCCESSFUL public-relations program for the oil industry means bringing knowledge and understanding of the oil industry to the grass roots of the entire country," Keeton Arnett, vice president of the Fred Eldean Organization, emphasized to a group of Tulsa oil men at a luncheon April 8.

Arnett is in charge of the planning of the public-relations program recently approved and inaugurated by the petroleum industry. He has visited oil centers throughout the United States in the last few months, and an organization to carry on the public-relations activities for the petroleum industry is being completed in all parts of the country.

W. G. Skelly, president of Skelly Oil Co. and a director of the American Petroleum Institute, was host at the luncheon which was attended by about 75 men representing a cross section of all divisions of oil activity in Tulsa and vicinity. Frederic F. Murray, president of Oil Well Supply Co. and chairman of the public-relations organization for District 3, was also present. Skelly explained the developments which led to the approval of the public-relations program by the American Petroleum Institute at its annual meeting last November.

Future Depends on Public Opinion

"I shall assume that everyone here today would like to preserve the free competitive system under which the oil industry operates, and to continue to earn a reasonable profit," Mr. Arnett said. "That being the case, it is necessary to recognize that the fate of that system—the fate of the oil industry itself—is linked inseparably with the climate of public opinion which surrounds it. If the public-opinion climate is favorable, then it will survive. If that climate should reach a preponderately unfavorable stage, then unquestionably a chain of circumstances or reactions would be set in motion and produce results which could prove disastrous.

"There is sufficient evidence to lead to the conclusion that favorable attitudes are based on knowledge and understanding of the system or of our industry. Unfavorable attitudes come into being as the result of lack of knowledge and the absence of elements which could produce understanding if they were but present."

Arnett emphasized that while his organization could be helpful in the direction of the program, its success would be dependent on the wholehearted support of the entire industry.

Following the luncheon an organization was agreed upon for the states of Oklahoma and Kansas. Paul Cain, of the Fred Eldean Organization, who has been assisting in the public-relations organization of District 4 (Rocky Mountains) will be in charge of the work for Oklahoma and Kansas.

Summer Advertising Campaign Proposed

SAN FRANCISCO.—A recommendation that the petroleum industry inaugurate an advertising program this summer will be made by the industry's public-relations operating committee to the public-relations committee of the American Petroleum Institute at its meeting in Washington April 21.

A resolution favoring the recommendation was adopted by the committee in a meeting here early this week. Reports at the meeting showed that organization of district committees in the public relations program is far ahead of schedule. When completed, the program will include 13 district committees with a combined membership of more than 1,000.

Texas Association Holds First Annual Meeting

DALLAS.—The first annual meeting of the Texas Independent Producers and Royalty Owners Association drew more than 130 members to the one-day meeting April 7. Morning and afternoon sessions were concerned with the election of new officers and adoption of resolutions. Guest speakers at the evening banquet were E. O. Thompson, chairman, Texas Railroad Commission; H. J. Porter, Houston, and Dr. Waldo E. Stephens, vice president, Stephens Petroleum Co., Oklahoma City, who spoke on the United States' foreign policy.

The resolution committee went on record as being opposed to the unitization bill now before the Texas legislature; the exportation of casing, tubing, and other oil-field equipment now in short supply in this country; the retention by the United States or any of its agencies, including the Federal Land Bank, and associations created under the Federal Land Bank Act, of mineral interests under lands which the U. S. Government or any of its agencies may sell. Members also pledged to petition congressmen to withhold appropriations for the National Petroleum Council. H. J. Porter, Houston, was renamed president. John I. Moore, Midland, was elected secretary, and C. S. McCaleb, San Antonio, treasurer.

Long Beach Picked For A. A. O. D. C. Meet

THE American Association of Oilwell Drilling Contractors will meet for the first time in California October 13-15 when it holds its seventh annual convention in Long Beach.

This decision was taken at a meeting of the board of directors of the association April 8 in Tulsa. The Tulsa board meeting initiated a new policy of holding the quarterly directors' sessions in cities outside Dallas, the association headquarters. Next board meeting will be held in Houston.

Approximately 25 directors attended the Tulsa meeting. During the morning and afternoon sessions, reports were given by several principal standing committees. A noon luncheon was held to give nondirector contractors an opportunity to take part in the general discussion.

Some expansion of the association's major educational project, the drilling-mud schools, was indicated. This was covered in a report of the research committee by Howard T. Holmes, Dallas, chairman.

During the last 9 months, the association in cooperation with the extension-training division of the University of Texas has conducted some 15 mud schools at various centers in the oil country. Approximately 800 have attended the schools, representing oil companies as well as drilling contractors. A total of $6,000 of the association's outlay for this work is matched by the university. Plans to continue the project beyond July, the end of the year for which it was originally set up, were under way.

Another report was that of the insurance and safety committee given by William Broadhurst, Tulsa. This emphasized the need for adequate insurance coverage for drilling contractors. Another project under this committee is a motion-picture film in color which the U. S. Bureau of Mines is producing with the assistance of the association. This film covers recommended drilling-safety practices and is to be ready in about a month.

The accounting committee report was given by W. D. McBee, Dallas. The group is helping the drilling contractor develop information to determine operating costs.

Presiding at the Tulsa directors meeting was J. E. Warren, Midland, Tex., president. Executive vice president of the association is Brad Mills, Dallas.

International

WORLD-WIDE OIL DEVELOPMENTS

Sinclair Prepares to Begin Test In Ethiopian Concession

BY the end of next year, Sinclair Oil Corp. hopes to have completed its first test well in Ethiopia, according to A. E. Watts, executive vice president, now in Cairo en route to the United States. Watts has been in Addis Ababa conferring with John H. Lock, assistant to L. V. Stanford, president of Sinclair Petroleum Co. Lock was sent to Ethiopia a year ago last February to commence research work on Sinclair's 350,000-sq. mile concession there.

The test well "will give us some indication of where Ethiopia stands in the Middle East oil picture," Watts was quoted as saying in a news dispatch from Cairo. Ethiopia is situated across from the Gulf of Aden and the Red Sea. Whether Arabia's oil structures extend to this part of Africa remains to be seen.

If oil is discovered in Ethiopia, "it will have an impact on the future status of such colonies as Eritrea and French, Italian and British Somaliland which border landlocked Ethiopia," Watts said, adding:

"It would give the United States petroleum reserves farther south than those now held by American companies in Iraq, and Saudi Arabia." Americans also hold interests in Kuwait and Qatar.

Possibilities of oil purchases by the Navy from Ethiopia were not overlooked by Sinclair's executive vice president. The Navy's oil purchases from Saudi Arabia and Bahrein Island are now the subject of considerable discussion before a Senate investigating committee.

A rotary rig capable of drilling a 15,000-ft. test is expected to be shipped from the United States by July, Watts explained, adding that from 8 to 12 months is the approximate time for drilling the first wildcat. The cost has been estimated at $1,250,000.

If oil is found in commercial amounts in Ethiopia, the Ethiopian Government has promised to obtain the necessary right-of-way for a pipe line, the terminus of which might be the Mediterranean. *(Details of the terms of Sinclair's Ethiopian concession were given in The Oil and Gas Journal, September 15, 1945, page 66).*

Creole's February Output Nears 600,000 Bbl. Daily

STEADILY approaching a 600,000-bbl. daily output, Creole Petroleum Corp.'s February crude-oil production averaged 599,192 bbl. daily. This is an all-time high. January's daily output was 586,715 bbl.

However, February's crude - oil throughput at the company's two Venezuela refineries was down to 37,635 bbl. daily compared with 57,756 bbl. daily in January. Of the crude oil refined in February, 27,985 bbl. were at Caripito and 9,650 bbl. at La Salina.

February's crude-oil production included 446,119 bbl. from the Lake Maracaibo area and Cumarebo and 153,073 bbl. from eastern Venezuela.

Fourteen development wells and four wildcats were completed in February. All the development wells were producers; one wildcat was a producer and the other three dry holes. The fields where the development wells were completed, their average initial production and depth follow:

Bolivar Coastal (B.C.F.), four, 690 bbl., 3,952 ft.; Jusepin, four, 341 bbl., 4,644 ft.; Mulata, three, 287 bbl., 5,035 ft.; and Quiriquire, three, 424 bbl. 3,932 ft.

Wildcat activity showed the one oil producer in the Mulata area with an average initial production of 156 bbl. at 5,415 ft. In the Jusepin area, JGE-31 was a dry hole at 5,474 ft. In the Quiriquire area, QGE-33 was a dry hole at 3,298 ft. In the Guarico area, the third dry hole was abandoned at 5,275 ft.

Colombian Gulf Plans Two Additional Tests

At least two additional tests will be drilled in Colombia by Colombian Gulf Oil Co. (subsidiary of Gulf Oil Corp.), one in the Sardinata concession and one in Zahino.

In about a month, Gulf expects to spud in on its second test in Zahino. This is located 5,300 m. (16,960 ft.) southwest of 1 Zahino. The first wildcat here was abandoned March 25 at 6,737 ft. in the Lower Cretaceous, black shale. Gulf's second test in Sardinata was spudded on the same date as 1 Zahino was abandoned.

Cooperatives Will Hold International Oil School

The first international petroleum-production, processing and distribution school to be conducted by cooperatives will be held in August or September in Kansas City under the sponsorship of the International Cooperative Petroleum Association.

Cooperatives in more than 12 countries will be represented, according to Howard A. Cowden, I.C.P.A. secretary. Cowden said articles and by-laws of I.C.P.A. are now being mailed overseas in preparation for a meeting of the temporary board of directors named at Zurich, Switzerland, in October 1946. The organization is expected to become a corporate entity following the board meeting.

Colombian Minister Resigns

Colombia's Minister of Petroleum Dr. T. E. Tascon, who took office last December, resigned late in March, with five other Liberal cabinet ministers, as a result of the March 16 elections which showed that the Conservatives won a substantial number of seats. Final results are still an issue.

Colombia Reported Ready to Sign New Concession Contracts

International

THE Colombian Government reportedly is ready to sign up at least one oil concession with each of the major companies in that country—and is particularly desirous of doing so with the companies which to date have no firm drilling concessions.

Companies with no firm Colombian concessions include Companias Unidas de Petroleo (Tri-Pet Corp., owned by Cities Service Co., Sinclair Oil Corp. and Richfield Oil Corp. of California); Phillips Petroleum Co.; Richmond Petroleum Co. of Colombia, and Superior Oil Co.

With nine major operators in Colombia, the government's new policy may mean granting the concessions under the terms of the present oil law plus the rider incorporated in the oil concessions signed last year. *(The Oil and Gas Journal, June 22, 1946, page 64).* In 1946, eight concession contracts were signed, and seven of these were actually granted. Seven concessions were also surrendered last year.

The nine concessions which the government may grant only can be the bids which have been "accepted" and which have not been object of private oil claims.

Only 25 Bids Free From Claims

As of December 31, 1946, a total of 479 concession bids had been filed with the ministry since 1931. Of these, only 180 had been accepted by the ministry as of the same date. Of the 180 bids, 53 were converted into concessions leaving, as of December 31, a total of 127 bids accepted. As of today, a study by the ministry reveals that only 25 concession bids of the 127 are free from private oil claims and therefore open to contract.

The 25 bids open to contract are distributed between the Llanos and elsewhere in Colombia in an approximate 50-50 proportion. There are now only some 12 concession areas subject to contract and within economic commercial limits, that is, within the Pacific, Caribbean and Lower Magdalena Valley oil areas.

The Llanos concession areas that might be contracted are adversely affected by the great inland distance and by the increased economic burden called for in the rider incorporated into the current concession contracts.

Article 9 of the contract provides that in case Congress approves a new oil law—expected to be passed this year—royalties, and surface fees are to be increased and that a new annual fee based on the acreage held during the commercial period would be payable, plus an initial lump sum in two installments, 25 per cent down and an additional 75 per cent when and if commercial oil is found.

Results Thus Far Slight in Egyptian Standard Test

Although news reports from Cairo indicate that Standard Oil Co. of Egypt, S.A., a subsidiary of Standard Oil Co. (N. J.), recently brought in a "promising well," Jersey Standard officials in New York report that operations in the Wadi Baba area so far have resulted in only a barrel of 8° to 10°-gravity crude on a drill-stem test.

Egyptian Standard was drilling to test the down-throw side of a fault but instead went through the side of the fault. The Wadi Baba area is south of Sudr, on the east coast of the Sinai Peninsula, where Anglo-Egyptian Oilfields, Ltd., and Socony-Vacuum Oil Co., Inc., jointly brought in an oil well last year. A field of considerable commercial importance is expected to be developed by the Anglo - Egyptian - Socony - Vacuum partnership.

Egyptian Standard had a better show of oil, 6 years ago, at Bakr, north of Ras Gharib field, but of no commercial significance. Drilling operations will continue in the Wadi Baba area, Egyptian Standard's Allan Owens said. *(For a recent detailed discussion of Egyptian oil-production activities, see The Oil and Gas Journal, February 8, page 46).*

Tide Water Reestablishing Foreign Products Outlets

Tide Water Associated Oil Co. is now marketing products in 50 foreign countries, according to the 1946 annual report. New distributors have been appointed in Mexico, Guatemala, El Salvador, Panama, northern Brazil, and Colombia. Negotiations are said to be proceeding satisfactorily for distribution of the company's branded products in Spain, England, and Denmark.

During 1946, the company stated, considerable progress was made in reestablishing sales outlets for lubricants in foreign countries. Improved shipping facilities and a gradual easing of foreign regulations on imports of high-grade lubricants make it possible to resume private-trade relations with most of the major countries in the European area.

Chile's Fifth Test Is Big Wet-Gas Producer

Chile's fifth test in Spring Hill field in the Tierra del Fuego Archipelago was completed last week as apparently a large gas producer with an estimated high gasoline content.

Surface pressure was 2,700 psi. Structurally higher than other wells in the field, completion of the fifth test increased estimates of the field's potential. It is the first well drilled on the northeastern side of the structure. Depth is about 7,500 ft.

Six more tests are being planned for completion this year, and it is expected that these will outline the limits of the new field.

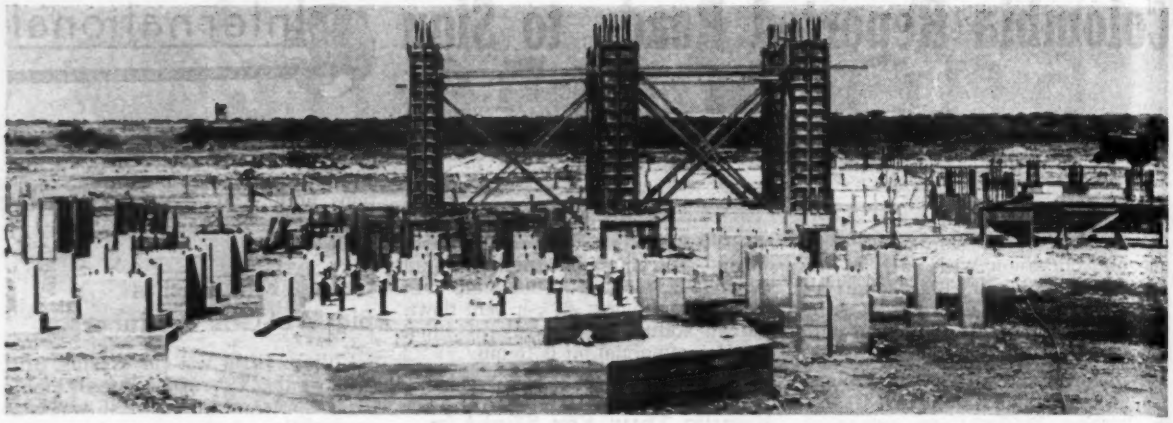
French Imports Show Decline in February

French imports of crude oil and products dropped to 389,288 metric tons (2,958,589 bbl.) in February, compared with 536,730 metric tons (4,079,148 bbl.) in January, according to a Reuters dispatch from Paris, quoting the French Ministry of Petroleum Production.

The following table shows imports of crude oil and principal products and country of origin (figures in metric tons; 1 metric ton is approximately 7.6 U. S. barrels):

	February	January
Crude oil—		
Iraq	53,840	129,385
Iran	41,361	84,238
United States	41,532	41,960
Venezuela	89,613	120,224
Total	226,346	375,807
Gasoline—		
Iran	1,033	7,569
United States	39,685	32,626
Venezuela	17,783	18,404
West Indies	19,105	12,222
United Kingdom	2,743	1,668
Other countries	268	942
Total	80,617	73,431
Gas oil—		
United States	15,653	10,853
Other countries	8,072	7,156
Total	23,725	18,009
Fuel oil—		
Mexico	1,206	4,051
Iran	10,632	11,627
United States	4,174	2,969
Venezuela	18,554	21,619
West Indies	4,233	3,587
Other countries	563	1,457
Total	39,362	45,330

In addition, France imported from the United States during February 1,406 metric tons of natural gasoline.



Building foundations for a distillation unit at Shell's Paraguana Peninsula refinery

Royal Dutch-Shell Group Expands Operations in Venezuela

CARIBBEAN PETROLEUM CO. and other associated companies of the Royal Dutch-Shell group operating in Venezuela have outlined plans for operations during 1947 which reveal a substantial expansion of activities and an increased program of construction. Other companies of the group operating in Venezuela include Venezuelan Oil Concessions, Ltd., Colon Development Co., Ltd., and British Controlled Oilfields, Ltd. The resume of the companies' activities that follows was prepared by Shell officials.

The major project of the Shell group during the current year will be the accelerated construction work on the Cardon refinery in the Paraguana Peninsula. Work was started early in 1945 and is now proceeding at an increasing rate, Shell having invested some 40,000,000 bolivares (about $12,500,000) in the project up to date. The total number now engaged in construction of living facilities and the refinery plant proper approximates 5,500, including contractors' staff and laborers. Difficulties with regard to essential supplies and equipment are still affecting construction, both of the plant and its related facilities, but materials are now beginning to arrive in larger amounts.

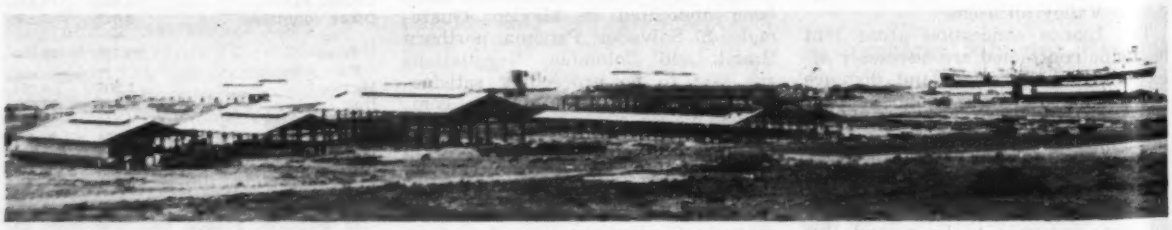
During January 1947, 10,000 tons of material were received. To facilitate the handling of still larger quantities of materials, construction of the first of two permanent jetties, each 450 m. (1,475 ft.) long, is well under way. Besides a fleet of barges and tugs, two Shell group ships are in continuous service for the transport of materials largely acquired by local purchase on the mainland of Venezuela.

Priority has been given in the Cardon refinery project to the essential preliminary work of erecting dwelling houses and recreational facilities and to the installation of temporary electric-light plants, water supply, and sanitation systems, and similar facilities. To date, some 200 buildings have been completed and 75 more are at present under construction. Two mess halls are in operation. Work has been started on the first of two churches, and buildings have been provided for two temporary schools which are in full operation, together with a commissary and provisional clubs for staff and laborers. Improvements have been made to two natural bathing beaches, protected by shark nets, and a bathing pavilion has been completed and is in use at one of the beaches.

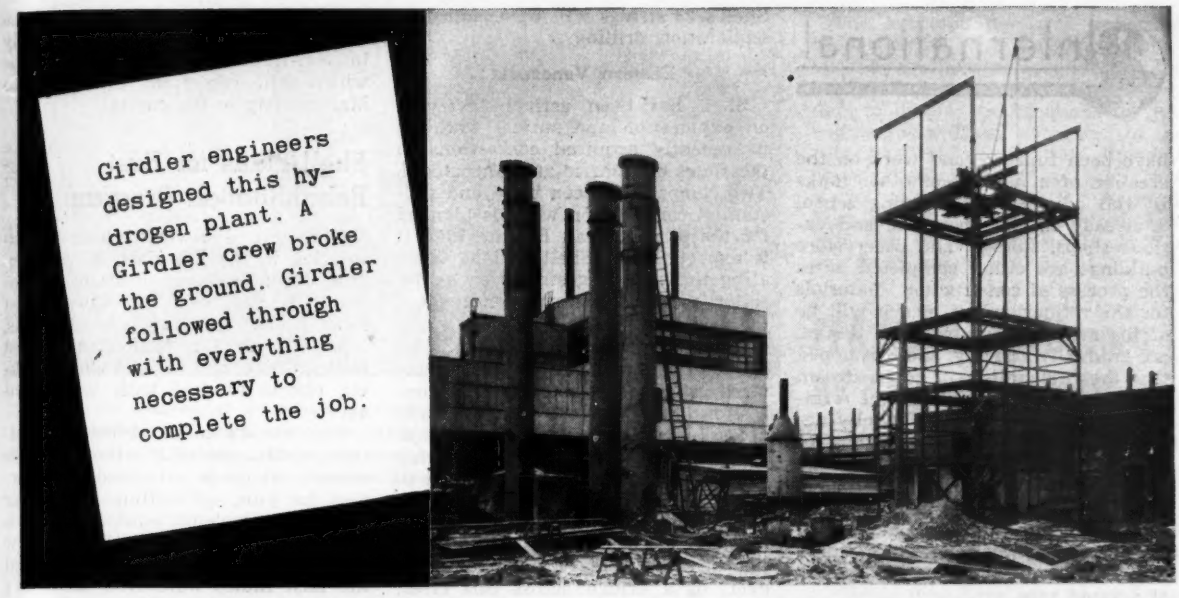
More Building Planned

It is planned that some 600 additional houses will be constructed at Cardon during 1947; in addition, various facilities in the living areas will be expanded through the erection of a bank, various shops, a restaurant, central garage, three large permanent schools, and an open-air cinema. Houses and buildings are of the most modern design and type, provided with complete sanitary facilities and planned to form, architecturally and topographically, a model community which, it is expected, will eventually accommodate more than 10,000 persons. To facilitate communication throughout the refinery and living areas, Shell has already completed nearly 175 km. (109 miles) of roads and streets and it is expected that further road building will occur in 1947.

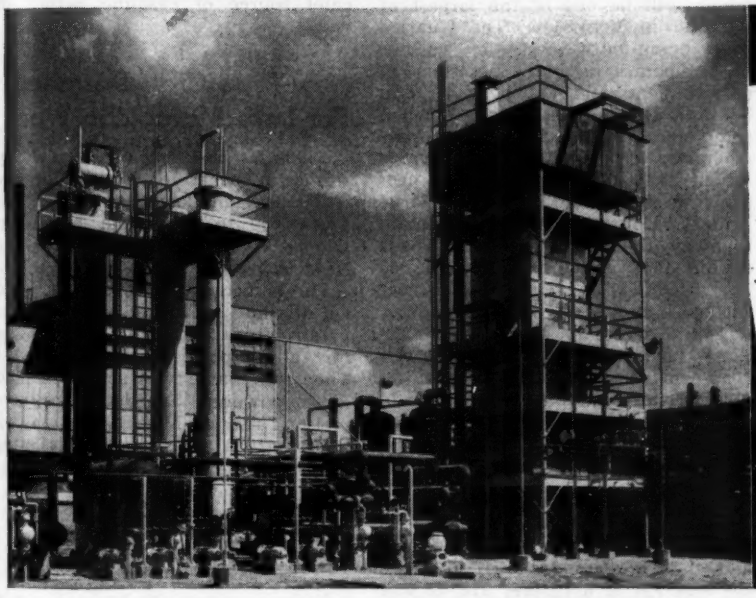
In the refinery area proper, foundations for the first units of the refinery plant are nearing completion. Six small and four large storage tanks



View of temporary jetty showing shops and storeyards area near site of the Shell refinery now under construction on Paraguana Peninsula



Girdler engineers designed this hydrogen plant. A Girdler crew broke the ground. Girdler followed through with everything necessary to complete the job.



A turnkey job, and another Girdler gas processes plant goes on stream — this one a HYGIRTOL plant producing highest purity hydrogen at lowest cost.

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DESIGNERS, ENGINEERS AND CONSTRUCTORS OF GAS PROCESSES PLANTS

have been finished, and work on the erection of a number of other tanks is well advanced. A welding school is already in full operation, and various shops, storage, and other store buildings are either completed or in the process of construction. Materials for the refinery plant, which will be of the most modern technical design, are gradually arriving, and it is hoped that the first units will go on stream early in 1949. The initiation of refining activities is, however, wholly dependent upon the timely arrival of the special materials required from abroad. In view of the extremely tight position of supplies in Great Britain and the United States, as well as elsewhere, work on the refining plants is unquestionably progressing at a rapid rate.

The lack of adequate water supplies in the Paraguana Peninsula has presented some difficulties, but these have been met through the installation of 10 modern distilling units which provide the people on the site and in the living areas with drinking water, in addition to that which is regularly brought in by tanker, for industrial and domestic purposes. Shell is now carefully studying, in conjunction with Creole, a project designed to provide a permanent solution to the water-supply problem. This will involve the laying, at an estimated cost of 12,000,000 bolivares (about $3,700,000) of a joint water line from the mainland near the town of Coro to service the refinery and living facilities both companies are erecting on Paraguana.

Western Venezuela (State of Zulia)

At the end of November 1946, the Shell group's production in Venezuela, which at present comes wholly from the Lake Maracaibo region, surpassed 300,000 bbl. a day, a record in Shell's activities in Venezuela, and a figure representing only slightly less than 30 per cent of the country's total production. At the end of 1946, Shell production was averaging 302,689 bbl. a day and it is presently anticipated that this production rate will not only be maintained but probably exceeded during the present year. The Shell group completed 160 wells in 1946, and the plans for 1947 call for even more intensive drilling, as it is hoped to complete some 270 wells this year. This will be done by increasing the number of drilling strings from 20 outfits as at present to 23 strings toward the end of this year. Most of the wells scheduled for drilling in 1947 will be located in existing fields, particularly Bachaquero and Tia Juana; but, during the latter part of 1947, nine of the Shell's 23 strings will be occupied in exploration drilling.

Eastern Venezuela

Shell has been actively carrying on exploration and survey work on its recently acquired concessions in the states of Guarico and Anzoategui. Two camps have been built, and substantial construction work is planned for the present year. By late 1947, it is expected that Shell will be operating three drilling strings on exploration wells in eastern Venezuela.

Apart from the lack of skilled and semiskilled workers in this region, one of the main difficulties encountered in exploring these eastern concessions has been the lack of ready accessibility for equipment and men. The Guarico highway is now nearing completion, and it is now possible to travel this road between El Sombrero and Puerto La Cruz by using a ferry to cross the Unare River. Construction is now being completed, however, of a bridge across this river, which will be one of the largest of its kind in Venezuela. The Guarico road, being built jointly by various oil companies having concessions in eastern Venezuela, will be more than 300 km. (186 miles) in length when completed. Its cost to date has amounted to over 10,000,000 bolivares (about $3,100,000), including the necessary construction of several large bridges. Departing from this main highway, the Shell group built roads during 1946 amounting to some 55 km. (34 miles) and plans to construct further lateral roads in 1947 together with the necessary bridges and auxiliary facilities. As a result of this road-construction activity, considerable territory has been opened up in eastern Venezuela.

General Plans

Excluding construction work at Cardon, the Shell group built 275 houses for its employes during 1946 and the program for 1947 includes the erection of a further 370. It will be noted, therefore, that when the Cardon program is included, the Shell group expects to build nearly 1,000 dwellings in Venezuela during 1947 for the benefit of its staff and employes. In addition, various Shell camps will be further enhanced during the year by the construction of churches, schools, clubs, restaurants, and similar facilities for the use and benefit of the 13,000 workers now on the payrolls of the Shell group.

It has lately become evident that the lines built by the Shell in 1937 from Catia de La Mar, near La Guaira, to Boqueron on the Caracas-La Guaira railway, which supply the gasoline and kerosene requirements for the city of Caracas and its environs, will be insufficient in the near future to meet the growing demand. For this reason and as another means of assisting the forwarding of materials and goods from the port of La Guaira, a project is now under study to construct a new products line which will run from Catia de La Mar directly to the capital.

Shell Plans for East Rehabilitation Program

Following a 3-weeks' tour of inspection in the Far East, E. J. Sturgess, chief engineer of Shell Petroleum Co., Ltd., said "we have a vast rehabilitation program ahead of us, especially in the Netherlands East Indies, China, and Malaya while making efforts to deal with war damage."

The world's main petroleum bottleneck, Sturgess said, is the materials market which is saturated with orders for pipe, oil drilling, and other types of petroleum equipment. This Reuters report from Auckland, New Zealand, said Sturgess explained that the East Indies were New Zealand's chief source of gasoline before the war.

New-Type Craft Designed For Lake Maracaibo Work

Keels for the first of 14 new-type service launches to be built for Creole Petroleum Corp. for use on Lake Maracaibo in Venezuela have been laid by Avondale Marine Ways, Inc., New Orleans.

The launches will have 40-ft. welded, all-steel hulls and aluminum superstructure and will be designed for all-purpose marine oil work. They will have twin screws and be diesel powered. Scheduled for completion late in May, the first will be given trial runs on the Mississippi River.

Norway Adds 29 New Tankers During 1946

Norway added 29 tankers, 16 of them in excess of 10,000 tons, to her tanker fleet during 1946, according to information made public by the Department of Commerce in Foreign Commerce Weekly.

The Norwegian tanker fleet now consists of 222 ships totaling 1,410,000 tons, including 190 motor tankers totaling 1,224,000 tons and 32 steam-powered vessels totaling 186,000 tons.

Russian Gas Line Finished

Completion of a 25-km. (16-mile) natural-gas pipe line in the U.S.S.R. between Grozny and the natural-gas deposit near the village of Pravoberezhnoye, on the Terek River, has been reported by the Soviet press, according to Foreign Commerce Weekly, Department of Commerce publication.

Three of the speakers at the annual convention of the Natural Gasoline Association of America will be J. H. Dunn, association president and president of Shamrock Oil & Gas Corp.; William M. Holaday, director of research, Socony-Vacuum Oil Co., Inc.; and T. S. Bacon, chief engineer, Lone Star Producing Co.

Annual N.G.A.A. Convention Opens April 23 in Dallas

TECHNICAL papers on natural-gasoline production, processing, and operating trends will highlight the twenty-sixth annual convention of the Natural Gasoline Association of America which will be held April 23-25 in the Baker Hotel in Dallas.

Registration and committee meetings will fill the morning of the opening day, with a technical session scheduled for that afternoon. A general and a technical session have been scheduled for Thursday morning and afternoon, with the convention's closing session, on Friday morning, to be devoted to an off-the-record forum on nearly all phases of the industry.

The tentative program follows:

WEDNESDAY, APRIL 23

2:30 p.m.—Cycling - operation session. "Progress Report, 1946-1947 N.G.A.A. Corrosion-Research Project Committee," Chairman T. S. Bacon, chief engineer, Lone Star Producing Co., Dallas; "Application to Cycling of Gas Injection Below Normal Gas-Water Contact," H. L. Hensley, production engineer, Humble Oil & Refining Co., Houston; "Mobile Laboratory for Gas-Condensate Studies," E. H. Koepf, research engineer, Atlantic Refining Co., Dallas; "The Nowata Road Tests," K. C. Bottenberg, research engineer, Phillips Petroleum Co., Bartlesville, Okla.

THURSDAY, APRIL 24

9:30 a.m.—General session. "Shortages," J. H. Dunn, president, Shamrock Oil & Gas Corp., Amarillo, and president of N.G.A.A.; "Public Opinion and the Future of the Oil Business," Jake L. Hamon, Cox & Hamon, Dallas; "Octane Versus Conservation," Ernest O. Thompson, chairman, Texas Railroad Commission, Austin.

2 p.m.—Motor - fuel session. "Motor-Car Trends and Desired Fuel Characteristics," William S. James, automotive research department, Ford Motor Co., Dearborn, Mich.; "Factors Affecting Quality and Supply of Internal-Combustion Engine Fuels," William M. Holaday, director of research, Socony-Vacuum Oil Co., Inc., New York; "Natural Gasoline Looks Ahead," G. G. Oberfell, vice president, and R. C. Alden, director of research, Phillips Petroleum Co., Bartlesville, Okla.

FRIDAY, APRIL 25

9:30 a.m.—"Information Please" session (forum on natural gasoline and cycling subjects). D. E. Buchanan, independent operator, will serve as moderator, assisted by a question-screening committee composed of F. B. Haverfield, Continental Oil Co., Ponca City, chairman; Allen T. Givens, Coltexo Corp., Monroe, La.; Charles W. Miller, Midland Gasoline Co., Houston; M. R. Church, Shell Oil Co., Inc., Houston; and A. H. Weil, United Gas Pipe Line Co., Shreveport. The panel of experts will include, by subjects: Plant and field operations—G. W. McCullough, Phillips Petroleum Co., Bartlesville, Okla.; D. N. Barrow, Arkansas Fuel Oil Co., Shreveport; and J. Earl Nutter, Hagy, Harrington & Marsh, Amarillo, Tex. Processing and construction—H. M. Nelly, Jr., J. F. Pritchard & Co. Refining operations—Walter D. Scheumann, Cities Service Oil Co., Lake Charles, La. Research—Dr. G. G. Brown, University of Michigan, Ann Arbor; Frank Fisher, Skelly Oil Co., Pawhuska, Okla.; and Walter Dayhuff, Standard Oil Co. of California, Los Angeles. Safety—Henry Boggess, Sinclair Prairie Oil Co., Tulsa. Legal and regulatory—Binford Arney, attorney, Austin, and J. K. Baumel, Texas Railroad Commission, Austin. Turbines and turboblowers—B. L. Spain, Ingersoll-Rand Co., New York. Liquid metering—A. J. Kerr, Pittsburgh Equitable Meter Division, Pittsburgh.

Jet-Fuel Specifications Subcommittee Named

Walter S. Hallanan, chairman of the National Petroleum Council, has announced the appointment of a subcommittee on jet-engine fuels specifications of the council's committee on the availability of fuels for military aircraft.

The subcommittee was appointed to participate in a proposed conference between representatives of the United States and the United Kingdom to discuss specifications for jet-engine fuels. Those appointed to the subcommittee are W. M. Holaday, Socony-Vacuum Oil Co., Inc., New York, chairman; D. P. Barnard, Standard Oil Co. (Ind.), Chicago; J. B. Hill, Sun Oil Co., Marcus Hook, Pa.; and S. D. Heron, Detroit.

FPC Claims Challenged By Magnolia Official

DALLAS.—Claims of the Federal Power Commission that it is saving gas consumers $35,000,000 annually through reductions in gas charges were challenged this week by Walace Hawkins, vice president of Magnolia Petroleum Co.

"While they have been making this saving, they have caused waste of gas exceeding three times this amount in value," he said, "and have thereby reduced the length of time consumers will have gas available."

Hawkins answered critics of proposed changes in the Natural Gas Act who contend that gas producers are looking for higher prices for natural gas by stating that while consumers are naturally interested in low rates for gas, "it is false to assume that they are not interested in the life of the gas fields and the opportunity to continue to use natural gas for heating, cooking, and industrial purposes."

Through its interpretations of the Natural Gas Act, Hawkins said, the FPC has and is driving from the market vast quantities of natural gas which could be entering interstate pipe lines. This gas is now blown into the air or burned, since the producer might better sacrifice his gas revenue than subject his oil and gas operations to FPC control.

13 More Tankers Sold By Maritime Commission

Sale of 13 tankers, nine of them to foreign operators, has been announced by the U. S. Maritime Commission. Sales brought the total number of tankers sold to 103, of which 50 have been transferred to foreign registry.

Of the latest group of tankers sold domestically, Tide Water Associated Oil Co. bought three and Cities Service Oil Co. one.

Foreign operators buying tankers included: Oriental Republic of Uruguay; Nederlandsche Koloniale, The Netherlands, two; Johs. Hansen Tankrederi, Norway; A/S M/S Hidlefjord, Norway; Oriental Trade & Transport Co., Ltd.; Overseas Tankship, Panama, two; and Esso Transportation Co., Britain.

Survey Shows Secondary-Recovery Possibilities in Arkansas

by Carl F. Hoot

SECONDARY recovery would add as much as 261,000,000 bbl. of oil to Arkansas' proven reserves of 279,997,000 bbl. (The Oil and Gas Journal, Annual Number, January 25, 1947), according to a summary of a report prepared by George H. Fancher, professor of petroleum engineering, University of Texas; and Donald K. Mackay, senior geologist, Arkansas Oil and Gas Commission; under the auspices of the commission and presented before the Fifty-sixth Arkansas General Assembly.

The survey pointed out that secondary recovery of oil in the state is particularly important to the economy of the state because of the current low rate of discovery of new oil fields. Although Arkansas ranks ninth among the states according to accumulative oil produced, less and less oil is being found and the rate of discovery is low. Not only are fewer oil fields being found, but also the quantity of oil discovery per new oil field and per wildcat well completed has decreased since 1942.

A comparison of Arkansas' declining activity was made with Bradford field of Pennsylvania, where, it was pointed out, some 235,000,000 bbl. of oil has already been recovered by water flooding, and another 100,000,000 bbl. of oil is expected to be obtained by the same method. Oil recovered by secondary methods at Bradford will exceed considerably that obtained by primary methods, it was said. In that connection, the survey has shown that over 40 times as much oil as was discovered in 1946 is available to operators in Arkansas through secondary-recovery methods.

Removal of Vacuum

One of the major problems confronting the proposed secondary-recovery program for the state was said to be the removal of vacuum from the older fields, and particularly at Smackover. Each operator employing vacuum to produce oil, it was said, will agree that its use is unsound but that he must use it in self defense. Removal of vacuum would result in a temporary decrease, it said, in oil production, due to a decrease in pressure differential between the formation and the well bore, and such action taken by an individual would result in inequities in favor of offset operators. This pressure differential can be reestablished, however, by the injection of gas or water into the producing formation, with accompanying decrease in production problems and an increase in the ultimate recovery.

The problem of obtaining full participation by all operators in an oil field needing secondary recovery was asknowledged as the greatest single obstacle to be overcome in the promotion of secondary recovery. The value of secondary recovery operations has been demonstrated forcefully in other states as well as in some of the newer fields of Arkansas, but nevertheless, it was said, secondary recovery has lagged in the older fields.

An example of noncooperation was an experimental operation in Smackover field. Injection of gas was undertaken even when a vacuum was being pulled on all surrounding leases, and in some instances, on those very leases on which gas was being injected. Under such unfavorable conditions, gas has channeled; oil otherwise recoverable has been bypassed, and secondary recovery acquired an unfavorable reputation.

Purpose of Survey

Purpose of the survey was to show that the logical solution to all the problems lies in the enactment of suitable legislation for secondary recovery. The investigators for the survey are convinced that nothing can be done to insure the removal of vacuum and little can be done to foster widespread use of secondary recovery until such legislation is enacted, requiring cooperation whenever it is necessary for successful operation and is not forthcoming voluntarily.

The authors of the report contend that legislation is needed to place all oil fields, regardless of age, under the jurisdiction of the state Oil and Gas Commission. They also believe that legislation similar to that adopted recently by Louisiana is needed to authorize, after a hearing for cause conducted by the commission, the adoption of any cooperative plan for the operation of an oil field which would increase the recovery of oil from that particular field to which a simple majority of the working interests agree, and which would require participation by all working interests in that field.

The survey was started in 1943, at the instigation of the Fifty-fourth General Assembly, which had directed that a survey of the prospects for secondard recovery of petroleum in Arkansas fields be made and the results reported to the assembly. After a thorough study of all data for each reservoir, a prediction was made regarding the possibility of applying secondary methods of recovery successfully. The survey contains tables, graphs, maps, and all pertinent data for each of the old fields of Arkansas with the exception of a few one or two-well fields. It does not deal with the gas fields in the northwest section of the state, which product only dry gas from sands in the Atoka formation of Pennsylvanian age, but is concerned with oil and gas-condensate fields of southern Arkansas in Miller, Lafayette, Columbia, Union, Nevada, Calhoun, and Ouachita counties. The complete report has been printed in book form and will be available from the Oil and Gas Commission about April 15.

Mid-Continent Revamping Refinery Cracking Unit

Mid-Continent Petroleum Corp. is revamping one of the thermal cracking units in its Tulsa refinery into a two-stage crude unit to increase the output of lubricating oils and waxes. With the new changes, the refinery will be able to process about 40,000 bbl. a day, according to the company's annual statement.

Arrangements have been completed for the installation of a catalytic-cracking unit as soon as materials and equipment are available, the statement said. Present thermal cracking capacity of the plant is 20,000 bbl. daily.

Refinery runs of the company during 1946 set a new record of 12,697,786 bbl., a daily average of 34,788 bbl. The average was above the 32,433-bbl. average of 1945 and 28.7 per cent above the daily runs averaging 27,029 bbl. in 1942.

Nueces Oil Corp. Buys Wells in Agua Dulce

Nueces Oil Corp., Dallas, has announced the purchase of 20 oil wells and 1 gas well in Agua Dulce field, Nueces County, from Sullivan & Garnett, Corpus Christi. The wells are on about 1,100 acres in the field. Sale price was reported to be about $4,000,000.

In another transaction, Grady H. Vaughn, Grady H. Vaughn, Jr., and Spartan Drilling Co., Dallas, sold 46 producing wells in two Arkansas pools to Sohio Petroleum Co. for $1,250,000. Included were 35 wells in Stephens-Smart field of Columbia and Ouachita counties and 11 wells in Gum Creek field of Ouachita County.

WASHINGTON WATCHING

BY HENRY D. RALPH

A Political Annoyance

WASHINGTON. — The administration's present concern over the recent general increase in petroleum products prices is largely of political origin, but some aspects of the price rise are under active antitrust scrutiny by the Department of Justice.

For the most part the increase can be easily explained by the higher price of crude oil plus higher refinery wages and other overhead costs. The higher crude prices, as explained in considerable detail in a recent bulletin of the Independent Petroleum Association of America, have long been forecast as a correction of the subnormal Office of Price Administration ceilings, increased drilling and production costs, and the need for more incentives for exploration.

Although petroleum prices are still very low in comparison with virtually all other commodity price indexes, and while the recent increase was actually quite small, the rise came just at the time when government officials were beginning a campaign to "talk down" prices generally. Administration economists believe that inflationary forces have just about spent themselves, and that the upward spurt in many commodity prices, particularly foodstuffs, since January is due for an early reversal. They have publicly commended several industrialists for announcing minor price cuts on their products, hoping in this way to start a general movement for price reduction.

Therefore the oil price increase, whatever its justification, was very annoying politically, particularly in view of the good earnings reports of many major oil companies.

View Increases With Suspicion

However, certain specific regional increases in gasoline prices look somewhat suspicious to the antitrust division of the Justice Department.

For the most part these suspicions center around the "price leader" custom of the petroleum industry whereby all operators usually follow price increases or decreases initiated by the concern which happens to be dominant in the area, both in crude oil postings and in products prices. This practice is common in many industries where all brands of the product have virtually similar specifications.

Defenders of this practice explain that no one could stay in business very long if he did not meet the prices of a competitor, particularly where that competitor already has a large enough share of the market to influence huge groups of customers. However, the Department of Justice always smells "conspiracy" when competitors' prices rise simultaneously.

So it is making an investigation of the recent increases in the prices of crude oil and petroleum products. This investigation might have been routine except for the administration's campaign to drive down all prices and the fact that Governor Warren of California, Senator Dworshak of Idaho, and other strategically situated political leaders have made specific complaints about oil prices in their areas.

Justice Department Tactics

THE "Mother Hubbard" antitrust suit against the American Petroleum Institute and all major oil companies is still scheduled for trial in spite of the Department of Justice's announced policy of filing a series of sectional and regional suits covering certain of the practices alleged in this over-all case.

This statement was made last week by Attorney General Tom Clark in a letter to Sen. Henry Dworshak of Idaho in answer to the senator's complaints that gasoline prices are higher in his state than in surrounding areas.

The A.P.I. case has been pending since 1940 and the general expectation is that it would be dropped as soon as the new series of suits was prepared. The only thing that has happened since last summer is that Sun Oil Co., one of the defendants, filed an answer and a set of interrogatories asking the department to make specific charges against this company. The time for filing an answer to this has been postponed half a dozen times, at the department's request, and is now scheduled for May 16.

In his letter to Dworshak the attorney general said:

"Additional information and investigation is necessary to prepare the American Petroleum Institute case for trial, and the department is proceeding as rapidly as possible with this investigation. However, because of the large number of defendants and the fact that the case involves nearly all aspects of the huge and complicated petroleum industry, from crude-oil production to retail sale of the manufactured products, progress necessarily has been and will be slow.

"Careful consideration has been given to means by which a speedier determination of urgently important problems in the oil industry may be reached. I have directed the antitrust division to devote particular attention to prices and pricing practices in the oil industry, affecting Idaho as well as other states, with a view to instituting an additional case on this narrow issue of price fixing, should such action be deemed warranted. I hope within a few weeks to be able to advise you further concerning developments in this respect.

"The department has recently filed a suit against Standard Oil Co. of California, and expects in the near future to file suits against other major oil companies, for the purpose of breaking up illegal control by them over service stations. The Standard Oil case involves such practices in Idaho. It is hoped that these suits will result in price competition between service stations and between different brands of petroleum products, and thus help eliminate some of the differential between retail prices in Idaho and other nearby states."

However, Dworsak's attention was called to the fact that Idaho's gasoline tax is higher than that of adjacent states and that Idaho prices include the freight rate from Salt Lake City, averaging about 2 cents per gallon.

Study of this letter indicates that the department is considering three different types of antitrust action in Idaho and doubtless elsewhere.

One of these is control by majors of filling stations not wholly owned and operated by them, as alleged in the Standard of California suit.

The second is the "follow-the-leader" practice, or the custom of letting one major initiate price changes in a certain area which are then followed by all other distributors. This is one of the complaints in the A.P.I. suit and was mentioned in the Dworshak letter, with Continental Oil Co. named as the "price leader" in the Idaho area.

The third is the matter of dealers' margins, which is alleged to be higher in Idaho than elsewhere. According to a department official the majors suggested that their dealers take a margin of 4½ cents but instead the dealers fixed their margin at 5 cents per gallon. This raises a suspicion of a price-fixing conspiracy among the dealers, and is being investigated.

The Appropriations Axe

INTERIOR DEPARTMENT officials are holding their breath and waiting for the axe to fall—the axe of the

House appropriations committee which has been heard ringing behind closed doors for several weeks while the committee has been doing some spring pruning.

The Interior Department appropriation bill is due to be reported to the House any day now. Weeks ago department officials completed testimony in defense of the Budget Bureau's recommendations, and the committee has been working on the bill in executive session. And according to reports it has really worked on and worked over every spending request submitted by Interior.

The Republican majority set out to slash several billions—they can't agree among themselves as to how many—from the president's budget, but so far they have not made as much progress as promised. In the appropriation bills handled so far this session they have been up against items which just can't be cut much because of legal obligations, things like interest on the public debt and care of veterans. So they are determined to make a better showing on other departments. And Interior is a good target.

For several years the Democratic majority on the House appropriations committee feuded with former Secretary Ickes and criticized his spending, and there is no evidence that the change in secretary and committee chairman has improved the relationship. Last year the committee singled out Interior for a stern lecture against government agencies which attempted to expand after the war instead of contracting as the committee felt they should.

Involved in Interior's budget and subject to the committee's axe are many funds of much importance to the oil and gas industry, such as maintenance of the Oil and Gas Division, secondary recovery and other research work of the Bureau of Mines, mineral statistics, geological surveys, public-land leasing, and dozens of other items. Reports leaking out about what the committee is doing to various other items in Interior's budget are so alarming that it would not be much of a surprise to find that the committee has chopped off activities which the oil industry thinks are well worth the taxpayers' money.

Tubular-Goods Survey

THE prospect that the demand for crude will exceed all previous estimates and will crowd closely on the heels of supply during the next year or two has raised a fear that tubular goods and other producing equipment may become critically short.

In anticipation of this, the Oil and Gas Division may ask a small interdepartmental committee to make a survey of the probable requirements for major items of oil-field equipment, particularly pipe. A similar committee is currently compiling data on orders for large-diameter oil and gas line pipe. No federal agency has authority to do anything about the situation at present, but it is felt that a forecast of the industry's steel requirements will be of value both to the oil industry and to the steel mills in programing future activities.

Tank-Car Controversy

THE battle over the Government's 423 surplus pressure tank cars is getting hotter and more involved.

The Office of Defense Transportation thought it had everything fixed up before expiration of the Second War Powers Act March 31. It had ordered War Assets Administration to sell the cars only to specified liquid-petroleum-gas shippers. This met the objective of keeping the cars in L.P.G. service, but ODT's sales allocation was much different from the present distribution of the cars under WAA lease. It took cars from companies with large fleets and gave them to competitors.

Then M. H. Champion of the Pioneer Equipment Co., a tank-line operator in Oklahoma City, brought suit in the District of Columbia courts to restrain WAA from going through with this sale. Champion is a veteran, with a veteran's preference certificate to buy 250 of these cars for his own business of leasing to L.P.G. shippers, and he insists that WAA follow the provisions of the Surplus Property Act in giving veterans first choice in all sales. The Department of Justice advised WAA not to go through with the ODT sales plan until this suit is settled.

ODT's Authority in Doubt

Meanwhile the Second War Powers Act expired, but Congress extended some portions of it until June 30. Some authorities think that the extended law does not give ODT power to set aside the Surplus Property Act, but ODT apparently thinks otherwise. On April 1 it issued a new directive to WAA instructing it to lease the cars to designated L.P.G. shippers. But its lease allocations were the same as its earlier sales allocations. But WAA moved faster, and renewed the old leases.

As matters stand at the moment, L.P.G. shippers have leases on the same number of cars which they have been leasing for the past several months, but WAA is under instructions from ODT to take some of the cars away from some shippers and lease them to others. WAA would like to get out from under ODT dictation and sell the cars in its own way, but the lawyers are still trying to figure out how the recent action of Congress affects the powers of the respective agencies.

During the House debate on the bill extending portions of the War Powers Act, Rep. Ross Rizley of Oklahoma bitterly criticized ODT and obtained from congressmen in charge of the bill an opinion that the new legislation would not continue ODT's authority in this matter.

Rizley told the House that the ODT plan was a reallocation of markets and would not result in more efficient use of the cars nor in better service to L.P.G. consumers generally. He charged that two of the men on the ODT staff who made the allocation were on the payroll of the company which would receive the largest number of cars under the plan.

FPC Rule Modification

PERMISSION for natural-gas companies to expand their facilities and engage in construction work without specific authorization from the Federal Power Commission is granted in a new rule which FPC intends to promulgate in the near future.

The rule will define a "service area" as used in the Natural Gas Act, and follows suggestions made in a recent staff report growing out of the natural-gas investigation. Interested parties are asked to file criticisms by April 21.

Instead of describing a geographical area within which an individual pipe-line company can expand without a specific certificate from the commission, the proposed rule will apply to all companies within FPC jurisdiction. Any company may increase the service to its existing customers and markets and its facilities for such service, by 10 per cent in any one calendar year without specific approval, but notice of intention must be filed with the commission, and FPC reserves the right to suspend the general approval and require a formal application for an additional certificate. Each company must file with FPC each year a statement of its installed delivery capacity, to serve as the basis for the 10 per cent increase.

In addition, the proposed rule permits pipe-line companies to install auxiliary equipment which does not increase delivery capacity, such as scrubbers, dehydration equipment, and incidental facilities; additional metering equipment and lateral lines for customers already being served; and replacement or relocation of existing equipment. Also, minor new customers may be added, for their own consumption or for resale, provided each customer will not use more than 75,000,000 cu. ft. per year. All changes in facilities must be reported, and the commission reserves the right to make compensatory adjustments in the company's valuation for rate purposes.

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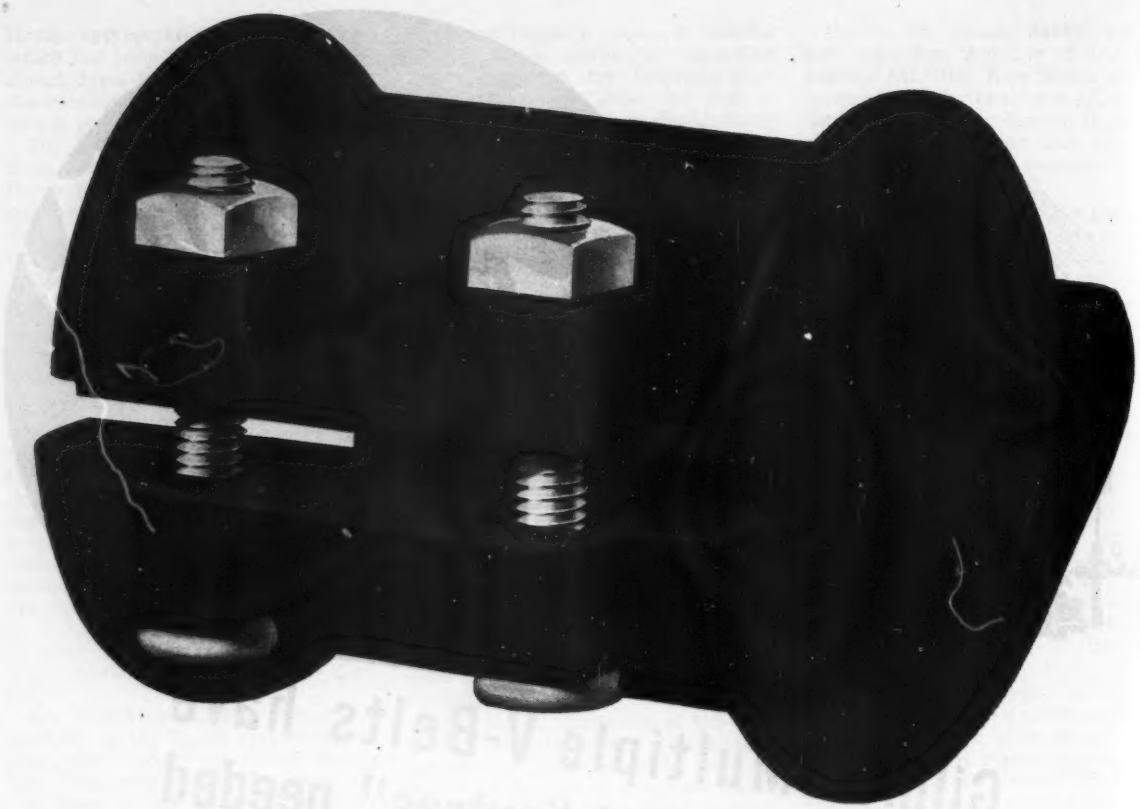

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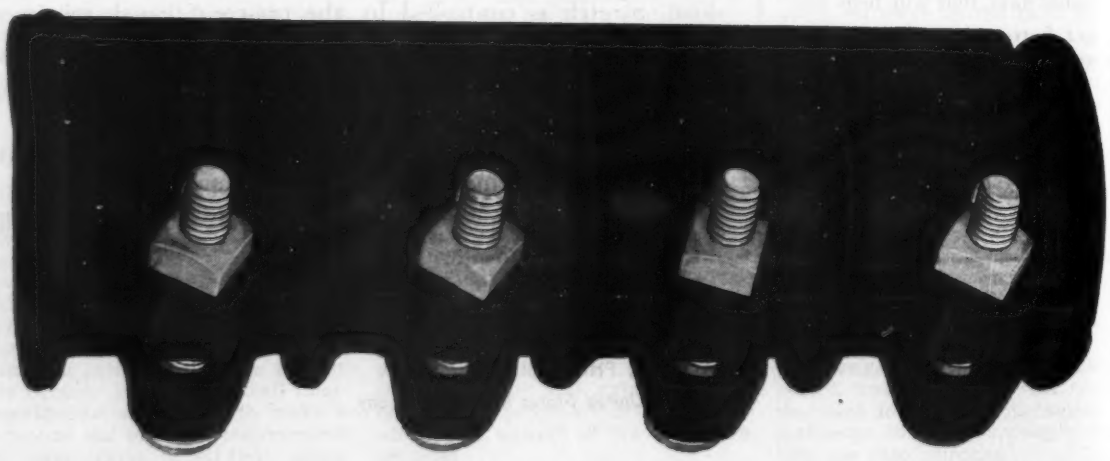


PERSONALS

Evans Named Head of Emeryville Laboratories

APPOINTMENT of Dr. Theodore W. Evans as manager of the Emeryville (Calif.) research laboratories of Shell Development Co. has been announced by A. E. Lacomble, president. He succeeds Walter J. Hund who died February 17.

Dr. Evans joined the Emeryville staff in 1930 as a research chemist and was active in the early development of alcohols, ethers, and esters from refinery cracked gases and in the development of the solvent-extraction theory.

Before the war Dr. Evans pioneered in the development of synthetic glycerin from petroleum. During the wartime rubber shortage his studies aided in providing early supplies of synthetic rubber by an exclusive Shell process.

By 1941 he was supervising all exploratory studies on new chemicals as well as research on their application in such fields as surface coating and resins. He was appointed an associate director of research in 1942.

Dr. Evans attended the College of Puget Sound in Tacoma, Wash., and in 1930 completed graduate work in chemistry at the University of Washington where he was awarded his Ph. D. degree.

H. F. Sheets, chairman of Socony-Vacuum Oil Co., Inc., is a member of the advisory committee to the State and Commerce departments' Board of Foreign Service. This organization meets to exchange views on the activities of governmental officials in promoting U. S. commercial interests abroad.

Robert Siegal, president of Socony-Vacuum Oil Co., S.A., in Venezuela, has taken up residence in Caracas.

Stanley Owens, safety engineer for Tennessee Gas & Transmission Co., Houston, has been promoted to manager of the insurance department. He has been succeeded as safety engineer by **B. J. Whitley.**

Frank C. Dougherty, The Texas Co., is a member of a representative delegation of United States business men who will attend the third plenary session of the Inter-American Council of Commerce and Production at Montevideo, Uruguay, April 8-11.

C. C. Hogg, director of the Edwy R. Brown School of Petroleum at Marietta, Ohio, College, has been appointed to the research and coordinating committee of the Interstate Oil Compact Commission by Gov. Thomas J. Herbert.

R. B. Edmonson was promoted to district engineer, Houma (La.) district, by The Texas Co. He has been connected with Texaco since 1937 when he started as a roustabout. He was field engineer at Lafitte field, relief engineer at Golden Meadow, Garden Island Bay, and Grand Bay before being promoted to district engineer.

Wayne C. Rauch, district geologist for Lion Oil Co. for East Texas and North Louisiana, has been transferred from El Dorado, Ark., to Rocky Mountain area headquarters in Grand Junction, Colo.

Dr. J. D. Weir, a member of the faculty of the University of Saskatchewan, has been appointed chief geologist for California Oil Co., Ltd. He was associated with the company 5 years before joining the university staff and is a past president of the Alberta Society of Petroleum Geologists.

W. M. Saxton, Michigan district manager for Pure Oil Co., has been named to the board of directors of the Michigan Oil and Gas Association to succeed **W. M. Peck,** former Michigan manager for Pure, who has been transferred to Tulsa.

Paul Montgomery, who headed the now defunct Louisiana Office of Natural Gas Conservation, Baton Rouge, has been named executive assistant to the state conservation commissioner.

C. M. SCOTT, JR.

C. M. Scott, Jr., assistant general manager in charge of operations, and **J. L. Shoemaker,** comptroller, have been elected to the board of directors of Stanolind Pipe Line Co. Their election was announced by **Bruce C. Clardy,** president.

Everett M. Barber, supervisor of the engineering research department of the Beacon laboratories of The Texas Co.; **Jay B. Malin,** mechanical engineer with The Texas Co.; and **Joseph J. Mikita,** director of the engineering laboratory of the petroleum-chemicals division of E. I. du Pont de Nemours Co. will be awarded Levy medals of the Franklin Institute at the institute's Medal Day ceremonies in Philadelphia April 16. The awards will be made for research in connection with the elimination of combustion knock.

Stuart E. Buckley, head of production research for Humble Oil & Refining Co., Houston, will address the Mid-Continent section of the American Institute of Mining and Metallurgical Engineers Monday evening, April 14, in Tulsa. He will discuss various problems of well spacing.

M. V. Rushmore, Gulf Oil Corp., has been elected president of the newly organized Oklahoma Landmen's association. **Cecil Lanier,** Magnolia Petroleum Co., is the new vice president, and **Charles Schock,** Stanolind Oil & Gas Co., secretary-treasurer.

M. M. Luther early this week was named comptroller for Stanolind Oil Purchasing Co. and elected to the company's board of directors to succeed **Henry Waters,** who has resigned. **George C. Getgood** was named assistant secretary in charge of the division order and contract department. In other changes **P. M. Broach** was named chief scout; **J. C. Mytinger,** assistant chief scout; **R. W. Boyd,** chief accountant; **T. E. Martin,** assistant chief accountant; **K. H. Klein,** administrative assistant (procedure); and **W. A. Kirkpatrick,** supervisor, coordinating department. The office of auditor was discontinued.

PERSONALS

A number of promotions and transfers in the producing department of The Texas Co. has resulted in the appointment of seven new assistant division managers and other personnel changes. The appointment of **E. R. Filley** as Texaco production manager in Houston succeeding **L. E. Barrows**, retired, was announced earlier.

J. H. Markley, Jr., division geologist, and **L. F. Shiplet**, division general superintendent of production, were appointed new assistant division managers at Fort Worth for the West Texas-New Mexico division. **E. M. Rowser**, geologist in the Fort Worth office, was named to succeed

J. H. MARKLEY, JR.

L. F. SHIPLET

Markley. **E. W. Lewis**, assistant division land and leaseman, was made division land and leaseman, succeeding **Tom T. Freeman**, transferred to Denver. **L. T. Barnett, Jr.**, assistant division warehouseman, South Texas division, was made West Texas division warehouseman, succeeding **C. F. Frey**, who is retiring.

Freeman becomes assistant division manager of the Rocky Mountain division at Denver.

TOM T. FREEMAN

The appointment of **Hial B. Gernert**, Rocky Mountain division superintendent, also as assistant division manager in Denver, was previously announced. Gernert has been succeeded by **J. F. Blackwell**, division petroleum engineer, who in turn was succeeded by **T. O. H. Matson**, Texaco petroleum engineer at Denver.

Louis T. Tighe, general superintendent of drilling and production of the South Texas division, was made assistant manager of the division. **R. B. Leggett**, formerly district superintendent at Hull, moved to Tighe's superintendency.

O. F. Ellzey, superintendent of the New Iberia (La.), district, was made assistant division manager of the Louisiana division at New Orleans. **J. A. Rhodes**, assistant New Iberia district superintendent, was named to succeed Ellzey at New Iberia; **G. T. Briggs**, division chief clerk at New

LOUIS T. TIGHE

O. F. ELLZEY

Orleans, was appointed assistant to the division manager. Other changes in the Louisiana division: **O. B. Trotter**, to the new position of general district superintendent of drilling and production; **J. L. Shea, Jr.**, to district superintendent at Houma succeeding Trotter; **A. B. Wardlaw**, to superintendent of gas and gasoline plants in the division; **L. R. Oliver**, to superintendent of the Erath recycling unit operation, succeeding Wardlaw; **J. O. Parris**, to division clerk succeeding Briggs; **J. W. Foley**, who formerly held the superintendency of the Louisiana division gas and gasoline plants, has been transferred to Houston as assistant to the producing department manager.

The appointment of **Mark L. Terry**, assistant division manager of the Rocky Mountain division, as assistant manager of the Oklahoma division in Tulsa, was previously announced. In this division, **J. Howard Johnson**, a member of the division manager's staff, was made assistant to the division manager.

Garth W. Caylor, Shell Oil Co., Inc., geologist in Tulsa for the last 9 years, has resigned to open offices as a consultant in Tulsa.

E. E. Ferrin, district petroleum engineer for Gulf Oil Corp., Houston, is being transferred to Kuwait Oil Co., Ltd., Kuwait, in which Gulf has an interest, to become chief petroleum engineer. A graduate of Rice Institute, Ferrin has been with Gulf since 1928.

Among recent visitors to Colombia were: **H. H. Hewetson**, president of Imperial Oil, Ltd.; **P. W. Lambright**, director and vice president of International Petroleum Co., Ltd.; **R. Dunsmore** and **W. J. Haley**, refinery coordinators of International Petroleum and Standard Oil Co. (N. J.), respectively; and **Frank W. Pierce**, a Jersey Standard director. **Van Den Wall Bake**, chief of personnel of the Royal Dutch-Shell group with headquarters at The Hague, also was recently in Colombia.

Homer C. Wilson has resigned as senior zone supervisor in charge of contract work for Humble Oil & Refining Co. at Baytown, Tex., to become mechanical superintendent of the new plant of Celanese Corp. at Bishop. Wilson had been with Humble 27 years.

G. W. Holbrook, of Bradley Producing Corp., Wellsville, N. Y., was named chairman of the production-research advisory committee of the Pennsylvania Grade Crude Oil Association at a recent meeting of the association board of directors in Bradford, Pa. Holbrook succeeds **Wilson K. Page**, Olean, N. Y., who resigned. A committee to survey the association's patent holdings was named by **D. T. Ring**, Columbus, Ohio, association president. Members are **E. E. Ebner**, Quaker State Oil Refining Corp., Emlenton, Pa.; **Joseph Hinman**, Pennzoil Co., Oil City, Pa.; **MacLean Houston**, United Refining Co., Warren, Pa.; **B. L. Heath**, Freedom Valvoline Oil Co., Freedom, Pa.; **Dr. Merrell Fenske**, Pennsylvania State College, State College, Pa., and **Fayette B. Dow**, Washington, association vice president and general counsel.

W. L. Massey has become production engineer for Grey-Wolf Co., Houston. He formerly was superintendent for American Liberty Oil Co. at Blessing, Matagorda County, Texas, in charge of cycling operations.

Carl M. Hill has succeeded **E. A. Brown** as chief production engineer for Lone Star Gas Co. Brown is now superintendent of production.

Ruskin H. Meyer, formerly with Republic Natural Gas Co., has become district geologist for MacMillan Petroleum Corp. in El Dorado, Ark. **Ted R. King** has become junior geologist for MacMillan in El Dorado.

J. L. Thompson, research engineer, Lone Star Gas Co., has been named head of the company's newly created engineering-development staff which will handle all special chemical analyses in the new Dallas laboratory. Others appointed to the staff are **F. K. Zapffe**, and **D. H. Brown**, control engineers; **I. J. Kaim**, chemist; **F. A. Hunold**, engineer, and **J. F. Roberson**, junior chemist.

T. E. Cook, formerly purchasing agent for Talco Asphalt & Refining Division, American Liberty Oil Co., at Mount Pleasant, Tex., has been transferred to the company's main office in Dallas where he will succeed **G. S. Hathaway**, retired, as manager of the sales office. He was succeeded at the Mount Pleasant refinery by **Dave Mertzbacher**.

A. Gamboa, W. Pareja, A. Serrano, and **J. A. Verano,** all Tropical Oil Co. employes in Colombia, are now in the United States for an extended stay to study industrial-relations problems.

C. C. Book has joined Republic Natural Gas Co. as corrosion engineer with temporary headquarters in Corpus Christi. He was formerly lubrication engineer with MacMillan Petroleum Corp. in New Orleans and petroleum engineer with Root Petroleum Co., El Dorado, Ark.

Alec M. Crowell has resigned from the staff of the Oil and Gas Division of the Interior Department to become vice president of Texas Eastern Transmission Co. in Shreveport. He will be in charge of supply and the purchase of gas for the Big Inch pipeline system which this new corporation has just obtained from the Government. In this work he will be associated with **R. H. Hargrove** of United Gas Co., who is taking leave of absence from his company to assist Texas Eastern in lining up gas resources. **Chandler H. Ide** also has left OGD and has returned to his home in California where he will become associated in business with **Ralph K. Davies,** formerly deputy administrator of the Petroleum Administration for War. Before the war Ide was with Davies in the Standard Oil Co. of California, was executive assistant to Davies throughout PAW, and has recently been associate director of OGD.

Mark C. Hopkins has been made assistant to director of research at the Texas City, Tex., refinery of Pan American Refining Corp. He succeeds **Frank J. Smith** who earlier was named manager of the new chemicals department of Pan American Petroleum & Transport Co., the parent organization. **Walter T. Herget** has become head of a department at the Texas City refinery which will handle the specialties manufacture. The refinery coordination section has been consolidated with the exploratory-economics section under **Dr. John E. Kasch** assisted by **J. D. Reed** as group leader.

Fred L. Whitney, office geologist, economics department, Carter Oil Co., Tulsa, has been transferred to Shreveport, La., where he will be a production geologist. Other recent Carter personnel changes include: **Joseph S. Bottler, Jr.,** engineer trainee, Tulsa, to junior engineer in the production department, St. Elmo, Ill.; **William A. Elliott,** junior geophysicist, Jonesville, La., to Roosevelt, Utah; **George R. McDannold,** engineer trainee, Tulsa, to St. Elmo, Ill., as junior engineer; and **John H. Oberwartmann,** junior geophysicist, Jonesville, La., to assistant computer, Warren, Ark.

Paul L. Bartram, Phillips Petroleum Co., has been made regional geologist with headquarters in Bartlesville, Okla. **I. Curtis Hicks,** Oklahoma City, has been appointed to succeed Bartram as district geologist for Phillips at Ardmore, Okla.

John C. Case, vice president in charge of foreign production for Socony-Vacuum Oil Co., Inc., has returned to the United States after spending several weeks in Saudi Arabia in connection with the plan to expand the partnerships of Arabian American Oil Co.

S. B. Irelan, president, Cities Service Gas Co., has announced the opening of company operating offices in Wichita, Kans. Officials at the new office include **C. D. Rogers,** superintendent of operations; **L. C. Benne,** assistant superintendent of operations; **H. B. Milam,** superintendent of gas transportation; **E. M. Rowland,** superintendent of compressor stations; **Clarence Allen,** superintendent of pipe lines; **C. A. Gibson,** superintendent of gas measurements; and **E. E. Lambe,** superintendent of the pressure department.

W. H. Ferguson, executive vice president of Continental Oil Co., and other officials attended a recent meeting of the company executives in Denver. Others present were **S. K. Clark,** chairman of the exploration committee; **G. C. Clark,** chief geologist; **L. F. Athy,** chief geophysicist; **J. C. Johnston,** superintendent of production in the Rocky Mountain division; **R. M. Barnes,** regional geologist, Los Angeles; **R. Ten Eyck,** geologist, Los Angeles; **A. K. Tyson,** superintendent of the Houston land division; **J. S. Royds,** geologist and member of the exploration committee; **H. P. McCauley,** superintendent of the Rocky Mountain land division; **A. E. Brainard,** division geologist; and **W. G. Olson,** district geologist, Casper, Wyo.

Victor Denslow, junior chemical engineer for Atlantic Refining Co. in the research and development organization in Philadelphia, has been promoted to assistant chemical engineer. Other Atlantic personnel changes include: **Gene E. Roark,** production engineer at Franklin, La., to junior petroleum engineer, Dallas; **Albert Specht,** DeRidder, La., lease pumper, to production foreman in East Texas; **J. P. Johnson,** district material man, New Orleans, to drilling engineer, Dallas; and **L. C. Hudry,** junior engineer, Dallas, to production engineer, DeRidder, La.

SHIFTS—

H. V. Thompson, foreman, Union Oil Co. of California, Inglewood to Glendale, Calif.; **J. N. Conley,** geologist, Seaboard Oil Co. of Delaware, Roswell, N. M., to Ardmore, Okla.; **Robert J. Steel,** engineer, Eastland to Abilene, Tex.; **D. R. Staples,** engineer, The Texas Co., Daisetta to Freer, Tex.; **T. S. Green,** foreman, Republic Exploration Co., Sinton to Halletsville, Tex.

Wayne A. Vaughn, chemist, Rogers Lacy Refining, Big Sandy, Tex., to Dallas; **Glenn Trimble,** engineer, Magnolia Petroleum Co., Alice to Brownfield, Tex.; **Darrell Smith,** engineer, The Texas Co., Houston to Conroe, Tex.; **J. B. Higginbotham,** superintendent, Sun Oil Co., Kingsville to Premont, Tex.; **Wayne C. Rauch,** geologist, Lion Oil Refining Co., El Dorado, Ark., to Grand Junction, Colo.

R. L. Sponberg, engineer, The Texas Co., Salem to Sims, Ill.; **Thomas J. E. Jobin,** engineer, Phillips Petroleum Co., Quincy, Ill., to League City, Tex; **Jack Gardner,** foreman, Carter Oil Co., Lyons, Kans., to Pauls Valley, Okla.; **Wayne Coffman,** engineer, Cities Service Gas Co., Bartlesville, Okla., to Wichita; **Carl Cooper,** superintendent, Wampler Brothers Drilling Co., Oklahoma City to Holdenville, Okla.; **Bob Leibrock,** engineer, Stanolind Oil & Gas Co., Tulsa, to DeWitt, Ark.

DEATHS

Felix Thibodeaux, 52, driller, died April 3 in a Liberty, Tex., hospital. His home was in Mont Belvieu.

John S. Burkhard, 75, retired oil operator, died April 2 in Tulsa.

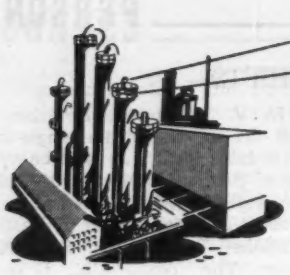
Jacob L. Haner, early-day oil operator in Oklahoma and Kansas fields, died April 1 in Muskogee, Okla.

James P. MacDonald, whose Messabe Oil & Gas 1 well in 1930 opened Kinsella gas field in east-central Alberta, died recently in Calgary, Alta.

George H. Gillons, 75, retired petroleum engineer and oil-company executive, died in Los Angeles March 29. In 1914-17, he established a refinery in Los Angeles which was the forerunner of the present Richfield Oil Corp.

Moses Ellis, 72, independent operator, was found dead April 5 in his home in Tulsa.

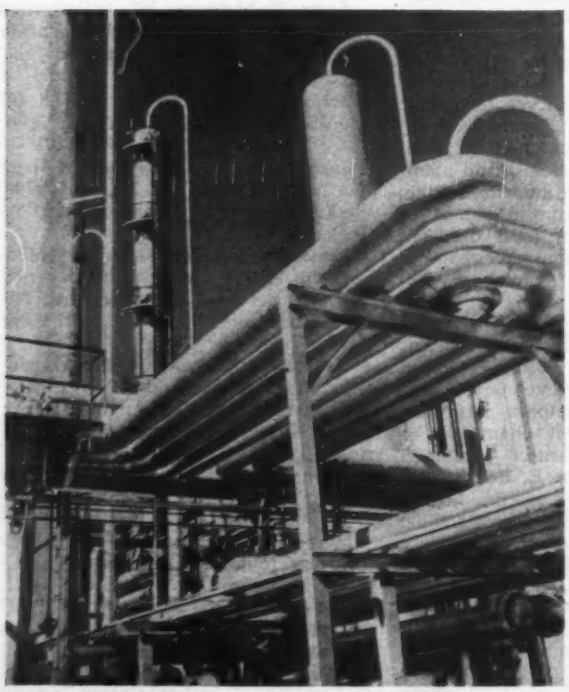
Carl Livingston, secretary of the New Mexico Oil Conservation Board, died late last week in Santa Fe.



CHEMICALS *from* Petroleum

by Joseph E. Bludworth

Manufacture of a long line of petroleum chemicals by the reaction of hydrocarbons with oxygen is fast becoming a major industry, and much of it is concentrating along the Gulf Coast in various units. Hydrocarbons are oxidized to aldehydes for use in plastics; alcohols as solvents, dye, pharmaceutical and other chemical intermediates; ketones for solvents, acids for all types of syntheses, and so on. This article shows in considerable detail the chemical steps in these various syntheses.



Above and left are photographs showing process areas in the petroleum chemicals plant of Celanese Corp. of America at Bishop, Tex., now being doubled in capacity

IT is quite well known that acetaldehyde, acetone, methanol, and formaldehyde can be obtained from natural gas. By other and as well-known methods the higher alcohols, aldehydes, and ketones can also be obtained from natural gas or some of its lower-molecular-weight components. If an attempt should be made to present, in any real degree, the total number of possibilities of chemicals from gas or its components the magnitude of the endeavor would be tremendous. If this effort should be further complicated by elaboration on or differentiation among methods for the manufacture of these chemicals, it is our belief the final result would be more confusing than informative.

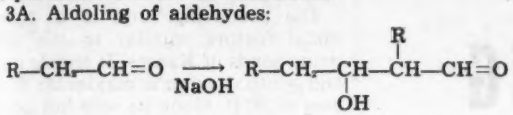
We have taken, therefore, as the basis for our discussion some of the existing possibilities in the production of secondary products from a few of the better-known primary or direct products of natural-gas processing. Too little space and effort have been directed toward consideration of the tremendous possibilities of aldehyde, ketone, and alcohol uses. Too much has been invested in radical plant changes that can only reduce the cost of these primary compounds by a fraction of 1 cent.

In order to develop some degree of clarity as to the possibilities of acetaldehyde processing, we have attached to this discussion a flow sheet showing a number of the possible derivatives from this processing.

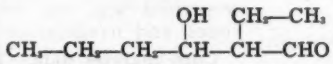
Acetaldehyde is reacted in the operation labeled 3A to give aldol, which can be reacted in second operations labeled 1B, 2B, etc., to give other classes of compounds.

The flow is continued until a series of four operations are shown here. In addition to the operations listed, product purification must be considered.

3A. Aldoling of aldehydes:



Starting material	Aldol obtained	Boiling point
Acetaldehyde	Acetaldol	83° C. 20 mm.
Butyraldehyde	Butyraldol	High



This reaction will go for any aldehyde having an alpha hydrogen.

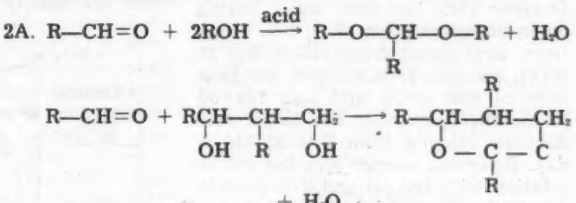
The aldols are very useful chemical intermediates. They can be used as a source of glycols, conjugated unsaturated aldehydes and ketones, and beta hydroxy acids.

The aldols are formed in good yields. The aldols of aldehydes are sometimes difficult to separate from their corresponding aldehyde due to a cyclic acetal formation.

The formation of acetaldol from acetaldehyde is carried out in a slightly alkaline medium below room temperature. The medium is the reaction product, which is circulated through a reaction tank and a refrigeration exchanger to remove the heat of reaction. Acetaldehyde and small amounts of water and caustic are added to the recycle and reaction product withdrawn at the corresponding rate and acidified to stop the reaction.

The reaction rate is controlled by the temperature and alkalinity and is such that the reaction time is long enough that the reaction can be controlled. If the reaction is allowed to proceed too far, higher aldols than acetaldol are formed. Only about 60 per cent of the acetaldehyde reacts to form acetaldol; the remainder forms a hemiacetal with acetaldol. The acetaldehyde in the hemiacetal cannot be removed from the reaction product by ordinary distillation, since the acetaldol dehydrates to crotonaldehyde under the influence of heat. By subjecting the mixture to vacuum at room temperature for an extended period of time the acetaldehyde can be stripped out, absorbed in water, and recovered from the aqueous solution by distillation.

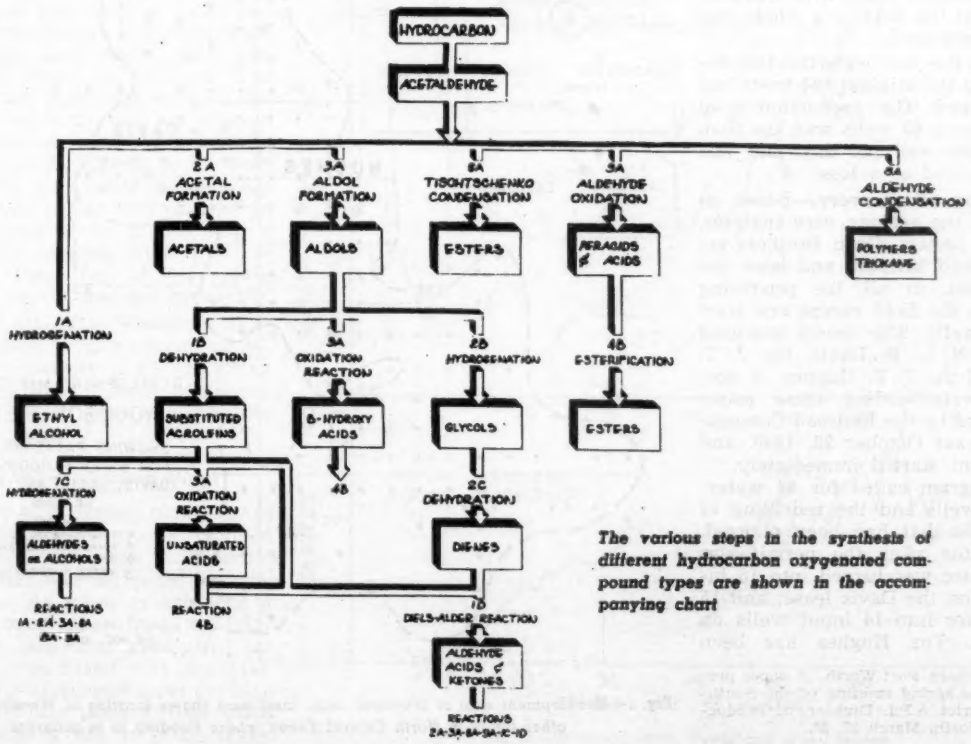
Acetals are formed from alcohols and aldehydes by heating in the presence of mineral acids and separating the acetal by fractionation after neutralizing the acid.



(Continued on page 87)

Joseph E. Bludworth, author of this article, until recently was director of petroleum chemicals research and development for Celanese Corp. of America, at Corpus Christi, Tex. The article, which was presented as a paper at the December 7, 1946, meeting of the South Texas section, American Institute of Chemical Engineers, has just been released. Bludworth is now directing technical developments for McCarthy Chemical Co.

FLOW SHEET



The various steps in the synthesis of different hydrocarbon oxygenated compound types are shown in the accompanying chart

Case History of

WATER FLOODING

In Throckmorton County, Texas

by Paul C. Dean*

THE Woodson shallow field is located 3 miles southwest of Woodson, in southeastern Throckmorton County, Texas. This is in the North Central Texas area where most of the waterflooding in Texas is now being done. (Fig. 1, inset). There is also a deep oil field near Woodson, but this paper is concerned only with the shallow field.

Primary oil recovery.—The Woodson shallow field was discovered in October 1929, the first wells having an initial production of 50 bbl. a day from sand found from 323 to 333 ft. When completely developed the field covered 400 acres and had 184 oil wells. The later wells had initial productions ranging from 3 to 35 bbl. a day. Reservoir energy was the gas in solution with the oil and this quickly depleted. The rapid decline of the oil production is shown by the production-decline curve of the Davis lease. (Fig. 2).

Air repressuring was tried on 30 acres for about 2 years, with mediocre success, but the field as a whole was never repressured.

By 1941, the year waterflooding began, 102 of the original 184 wells had been plugged. The production from the remaining 82 wells was less than 1/3 bbl. per well per day, and was being operated at a loss.

Secondary oil recovery.—Based on a study of the geology, core analyses, and other factors, Dean Brothers acquired a half interest, and later the full interest, in all the producing acreage in the field except one tract with 10 wells. The leases acquired were the N. L. B. Davis, the J. T. Odell, and the J. E. Hughes. A permit for waterflooding these leases was granted by the Railroad Commission of Texas October 28, 1940, and development started immediately.

The program called for 44 water-injection wells and the redrilling of 40 oil wells that had been plugged. Four months after the permit was issued, water was turned into 18 input wells on the Davis lease; and 15 months later into 14 input wells on the Odell. The Hughes has been flooded in four stages, the latest inputs being added in 1946.

Suitability for Water Flooding

Geology.—The Sedwick limestone, lower Permian in age, is the surface formation in this field. The oil sand, known as the upper Tannehill, is a part of the Pueblo group, lower Permian in age. The Permian-Pennsylvanian contact occurs at a depth of about 450 ft. in the field. These formations are mostly shale and red beds, with some thin limestones and sandstones, with no water from the surface to the producing sand.

The producing sand is a depositional feature, similar to the shoestring sands of Kansas. It trends north and south, having a maximum thickness of 30 ft. along its axis but pinching out to the east and west. Original logs showed a gas sand above the oil, but coring showed this to be sandy shale. The oil sand is of uniform texture with few shale breaks, and evenly saturated with oil. Contours on top of the sand show a normal westward dip, but with numerous noses and irregularities.

Core-analyses data.—The four original core tests proved to be fair samples of the field. As development progressed 15 additional wells were cored, and the average of the 19 analyses shows:

Item—	Avg.	Range
Sand thickness, ft.	15.6	11-28
Porosity, per cent	26.5	24-31
Permeability, md.	413	137-620
Residual oil saturation, per cent	20.5	13-26
Water saturation, pct.	53.8	47-66

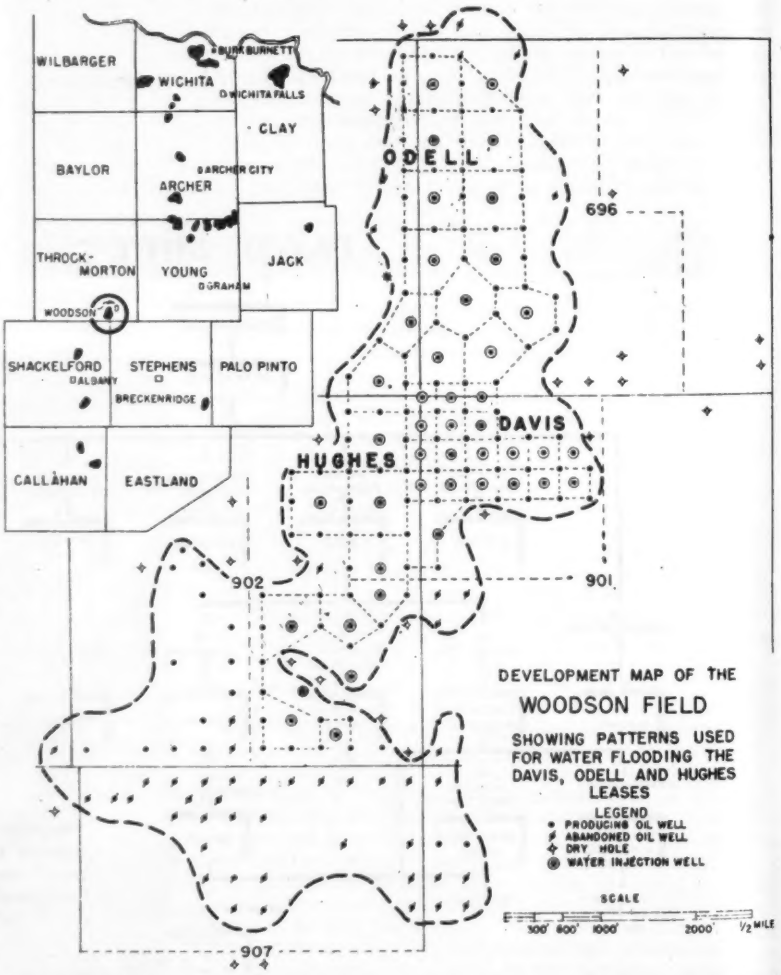


Fig. 1—Development map of Woodson field. Inset map shows location of Woodson field and other fields in North Central Texas where flooding is in progress

*Dean Brothers, Fort Worth. A paper presented at the spring meeting of the Southwestern district A.P.I. Division of Production, Fort Worth, March 27, 28.

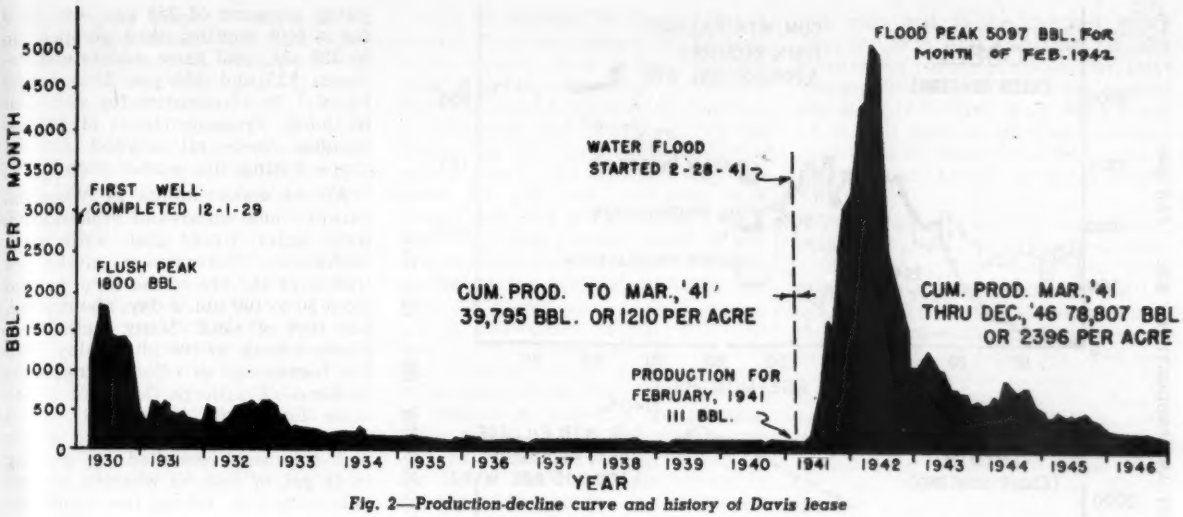

FLOOD PEAK 5097 BBL. FOR MONTH OF FEB. 1942
WATER FLOOD STARTED 2-28-41
FIRST WELL COMPLETED 12-1-29
FLUSH PEAK 1800 BBL
CUM. PROD. TO MAR., '41 39,795 BBL. OR 1210 PER ACRE
CUM. PROD. MAR., '41 THRU DEC., '46 78,807 BBL OR 2396 PER ACRE
PRODUCTION FOR FEBRUARY, 1941 111 BBL.
BBL. PER MONTH
YEAR

Fig. 2—Production-decline curve and history of Davis lease

Residual oil content, bbl. per acre ft.	425	267-608
Residual oil content, per acre	6,667	3,628-11,500

All cores were taken with a cable-tool barrel using water-mud base, and the low oil content may be due partly to flushing of the core while drilling. The porosity is good, but with a low oil content and a thin sand, the total oil content makes a poor comparison with the Bradford sand of Pennsylania, or the Bartlesville sand of Oklahoma. This poor showing, however, is partly offset by the lower installation costs, due mainly to shallower depths.

When the 19 core analyses are spotted on a map, lines of equal porosity, permeability, and saturation trend north and south with the length and strike of the field. The variations are from east to west. Porosity and oil saturation are best on the east side; permeability and water saturation are the highest on the west or down-dip side. Half of the wells cored showed a few feet of sand in the lower part of the section with a permeability ranging from 1,500 to 1,800 md. The effect of this highly permeable streak was not noticeable.

Type of oil.—The Woodson oil is greenish black, with a gravity of 36° A.P.I. The viscosity is 6.8 cp. which falls well within the range of viscosities that have been successfully flooded to date.

The Water-Flooding Plant

One centrally located plant serves all three leases. Water is pumped from a lake, just west of Woodson, to the water-treating plant on the Davis lease. As much as 2,500 bbl. a day have been taken from the lake, but as the salt-water production increased, it was mixed with the fresh water, and withdrawals from the lake reduced. At the present time 1,300 bbl. of water a day is being taken from the lake and mixed with 1,300 bbl. of salt water.

Before injection, the mixed water is treated to remove impurities. The treating plant consists of two sedimentation tanks and one 4 by 8-ft. water filter. The sedimentation tanks are high 500-bbl. redwood tanks each partitioned into three compartments. Alum and lime are added as the water goes into the first compartment, and as it circulates under and over the partitions in the tanks, most of the sediment is removed. The water then flows by gravity through the filter and into clear water storage tanks, where it is picked up by the injection pump.

The injection pump is a 5 by 10-in. horizontal duplex pump, powered by a 50-hp. diesel engine, no gas being available. Three-inch main water lines carry the water from the pump to each lease, and 2-in. lateral lines to each input well.

Water Injection

Patterns.—As shown in Fig. 1, the

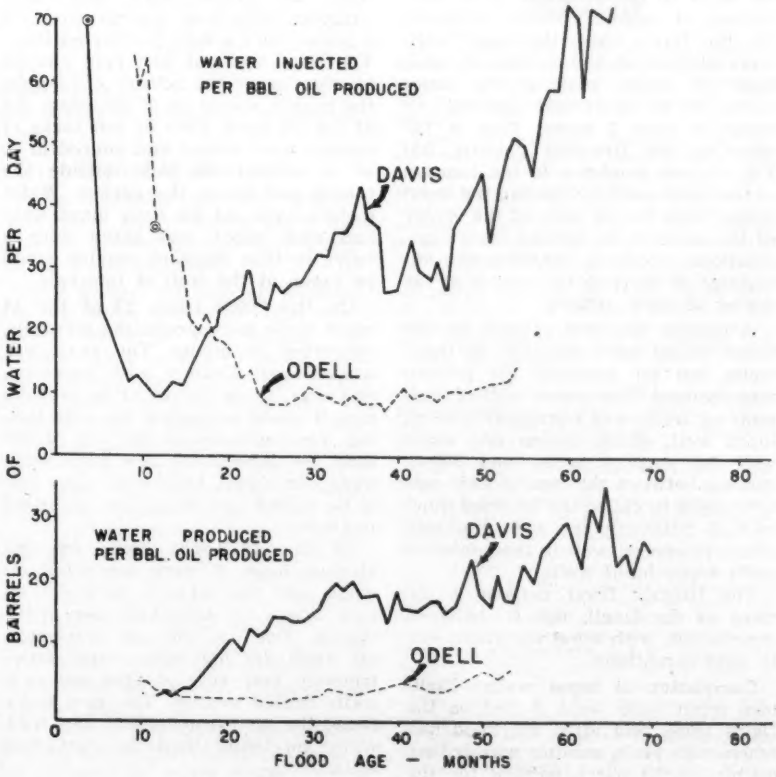


Fig. 3—Water-oil ratio, Davis and Odell leases

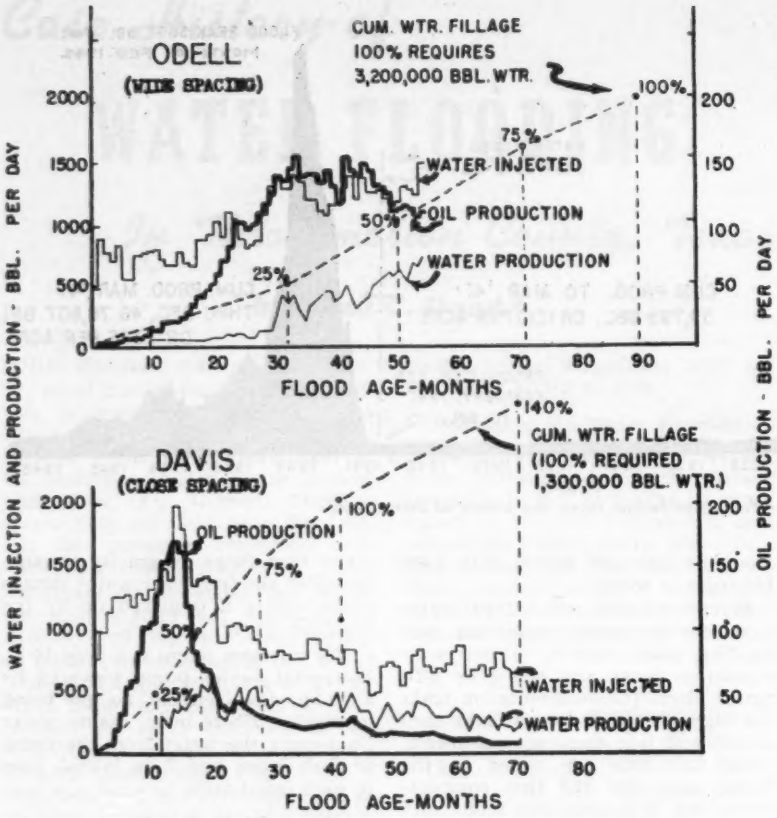


Fig. 4—Production and water-flood history, Davis and Odell leases

oil wells in the Woodson field were drilled at regular 300-ft. locations. On the Davis lease, the input wells were drilled at the center of each four oil wells, making the input wells 300 ft. apart and figuring one input to each 2 acres. This is the same as the five-spot pattern, but Fig. 1 gives emphasis to the location of the input well, by placing the input rather than the oil well, at the center of the pattern. In making water calculations, there is considerable advantage in spotting the inputs at the center of each pattern.

A similar five-spot pattern for the Odell would have required 42 input wells, but for economy the pattern was changed. The center well of each nine oil wells was converted into an input well, which means one input well for each 8 acres, and 600-ft. spacing between the inputs. This pattern might be called the inverted nine-spot, as ordinarily the term nine-spot refers to one oil well in the center of eight water-input wells.

The Hughes flood pattern is the same as the Odell, 600 ft. between input wells, with some variations due to sand conditions.

Completion of input wells.—Eighteen input wells were drilled on the Davis lease, and after the flood had reached its peak, another was drilled, mainly to fill out a pattern for the adjoining Hughes lease. These wells were all drilled new and were equipped with 2-in. tubing, run with a packer and a 4-in. perforated liner. The liner was cut just long enough so when set on the bottom of the hole, the packer would be at the exact top of the oil sand. Five or ten sacks of cement were mixed and poured in so as to cement the hole outside the tubing and above the packer. Water meters were set for each input well, and each input was fitted with a valve so that pressure reading could be taken at the well at intervals.

On the Odell lease, 10 of the 14 input wells were producing oil wells, converted to inputs. The sand was washed and cleaned with kerosene, and after lifting the oil string to make sure it could be pulled, the 2-in. tubing was cemented at the top of the sand, the same as the new input wells were completed. Only one input had to be drilled new to fill out undrilled locations.

Of the 11 input wells on the Hughes lease, 6 were converted oil wells, and the other 5 were drilled new where old wells had been abandoned. Two of the six converted oil wells did not take water satisfactorily, and were plugged and new wells drilled nearby. The new wells found the sand broken, and they took water no better than the converted wells.

Pressures and volumes.—Initial pump pressure of 250 psi. was used for a few months, then stepped up to 325 psi., and since maintained between 325 and 350 psi. This equals about 1 lb. of pressure for each foot of depth. Pressure charts of the individual wells all showed decided drops during the winter months.

All 44 water inputs at Woodson, except 3 near an area of broken sand, took water freely and with great uniformity. The average intake per well over the life of the flood ranged from 50 to 100 bbl. a day, about 5 bbl. per foot of sand. Many wells were pinched back to 100 bbl. a day from the beginning, an effort being made to have all patterns flood out at the same time. Only occasionally would a well slow down on taking water, and this was remedied by pouring in 10 gal. of acid, or washing out the hole with 1-in. tubing run inside the 2-in.

The total injection to January 1, 1947, has been 1,925,531 bbl. in the Davis lease, 1,668,109 in the Odell, and 551,409 in the Hughes. Fig. 3 shows the barrels of water required to produce 1 bbl. of oil on the Davis and Odell leases.

Results of Water Flooding

The Davis lease: 32 acres, 21 oil wells, 19 input wells.—Fig. 2 shows the complete production history of the Davis lease. Water was turned in on February 28, 1941, and the response was quick. Starting with 3 bbl. a day, oil production rose rapidly to a peak of 205 bbl. a day, 13 months later. The decline was almost as rapid. Now 6 years old, this flood really ended its economic life in November 1944, when enough water had been injected to completely fill the pore volume in the sand, shown as 100 per cent on Fig. 4. Actually, however, the lease is still being pumped and production for December 1946 averaged 7 bbl. a day with 160 bbl. of water. Cumulative oil production by water flooding to January 1, 1947, amounted to 78,807 bbl. almost twice the 39,795 bbl. produced up to the time water flooding was commenced.

The Odell lease: 96 acres, 47 oil wells, 14 input wells.—Water was turned in on the Odell lease May 27, 1942, but due to the wide spacing of the inputs, response was much slower than on the Davis flood. Beginning with 3 bbl. a day from the 47 wells, a year later the lease was only making 18 bbl. a day. At the end of the second year production was up to 100 bbl. a day, and the peak production of 266 bbl. in one day was reached in March 1945, just 33 months after flooding commenced. The decline has been as gradual as the rise and for December 1946, production averaged 104 bbl. a day. Cumulative production by water flooding to January 1, 1947, amounted to 147,198 bbl.

The Hughes lease: 57 acres, 38 oil wells, 11 input wells.—The first benefit to the Hughes lease came from four injection wells drilled on the Hughes-Davis lease line, water being turned into these on February 28, 1941. Later in 1942, injection was started in three new input wells on the north end of the lease. Again in 1945 and 1946 new inputs were added to the south. During this period production gradually increased from 15 bbl. a day to an average of 63 bbl. a day in July 1946, or 65 months after the first water was turned in, but this may not be the peak as the south eight injection wells have not been in operation long enough to cause an increase. In December 1946, production averaged 48 bbl. a day and cumulative production by water flooding was 62,959 bbl. to January 1, 1947.

Wide Versus Close Spacing

A comparison of the per-acre recoveries of the Davis and Odell leases is really a comparison of the results of close and wide spacing. Data on the Hughes are omitted because of its incomplete history.

Fig. 4 shows enough water has been injected in the Odell reservoir to half fill the calculated pore volume, whereas enough has been injected into the Davis to fill it almost 1½ times. The cumulative water fillage curve shows the per cent of fillage of the pore volume under each lease. The Odell fillage curve is projected to July 1950—the time it will take to fill this reservoir 100 per cent at the present rate of injection.

To January 1, 1947, the per-acre recovery of the Davis lease with its 140 per cent water fillage, was 2,396 bbl. compared with 1,533 bbl. from the 52 per cent filled Odell lease. A reasonable projection of the Odell production-decline curve for 3½ years, or to the time of 100 per cent water fillage (Fig. 4) indicates it will produce to that point, 2,400 bbl. per acre. If the curve is projected to the point of 140 per cent fillage, the production would considerably exceed the Davis. Furthermore, the comparison is better than this figure indicates, for the average sand thickness of the Odell is 15 ft. compared with 17 ft. on the Davis, and a normal expected recovery from the Odell would actually be 12 per cent less than the Davis. Allowance should also be made for a difference in patterns, theoretically the Davis five-spot pattern being more efficient than the Odell inverted nine-spot pattern. There may be other differences that should be considered, but generally speaking the leases are very similar and the main difference, the sand thickness, is one that can be measured. The result shows that for Woodson one water input well on 8 acres will flush out more oil than four inputs on 8 acres.

This is further confirmed by a careful estimate, pattern by pattern, of the amount of oil in place on each lease at the time flooding was started. This calculation showed 285,000 bbl. on the Davis and 620,000 bbl. on the Odell. The recovery from the Davis amounts to 28 per cent and from the Odell 24 per cent, or only one-seventh less and with 3½ years to go. Sand thickness, porosity, and oil saturation were considered in this estimate, but the greatest variable was sand thickness.

This conclusion agrees with the theory that wider spacing permits the accumulation of a greater bank of oil ahead of the flood. The growing oil saturation increases the permeability to oil, and delays channeling, thereby increasing the efficiency of the flood. This is plainly shown in Fig. 3, where much less water was required to produce a barrel of oil on the Odell than on the Davis. There were 2 months during the life of the Davis flood when less than 10 bbl. of water were required to produce 1 bbl. of oil; the Odell operated for 2 years using less than 10 bbl. of water for 1 bbl. of oil. The ratio of the water produced with the oil on the Odell was far superior to the Davis.

From the operator's viewpoint, the wide spacing pattern effects great savings on installation costs, and also on extra equipment that might be needed to handle higher peak production for a very short period. Operating costs per barrel are also much lower, due to lower water-oil ratios as shown on Fig. 3, although allowance must be made for the longer time required to flood the wide-spaced patterns. At Woodson, all the profit came from the wide-spaced patterns.

Operating Problems

Water flooding naturally involves more work and requires more men than are needed for the mere pumping of a stripper lease.

On a project the size of Woodson, two or three full-time men were needed to keep the treating and pressure plant going, to make daily tests of the quality of the water, check the input wells, and read the water meters. Occasionally the water treatment would have to be changed, due to heavy rains that muddied the lake water. Or sometimes a water input would break loose, taking several hundred barrels in 1 day, and this well would have to be cut back. Or sometimes the inputs would slow down, and would have to be acidized or washed out. Leaks in water lines would have to be promptly repaired. All these happenings require 24 hours attention at the treating and pressure plant.

At first, the oil wells were pumped 8 hours a day, but eventually had to be pumped 24 hours a day, which required extra pumpers. Every pumping well had to be checked every day, for if it quit pumping for any mechanical reason it would soon start flowing, making a bad mess around the well. Individual tests were made on the oil wells at intervals, using a portable test tank. These tests gave a good picture of the progress of the water.

The original pumping equipment, consisting of central powers, rod lines, and jacks at each well, was good enough for stripper wells making 1/3 bbl. of oil a day. But when water flooding pushed the production up to 60 or 80 bbl. of fluid per well per day, the strain was too much, and the jacks, rod lines, powers, and storage tanks practically had to be rebuilt. At one time it looked like disposal of salt water would be a major problem but this was solved by mixing it with fresh water and reinjecting into the sand.

Corrosion was severe on the original working barrels and the lower part of the tubing, but was largely remedied by using brass barrels. This corrosion was responsible for many leaks and pulling jobs. A pulling crew and a roustabout crew were kept constantly busy pulling wells, repairing leaks and breakdowns.

Other floods have had very expensive oil-treating problems, but at Woodson no chemicals, and little heating were required.

BOOKS

OIL AND GAS PRODUCTION DATA, EDDY COUNTY, NEW MEXICO, 1943-1945. Circular 14, New Mexico Bureau of Mines and Mineral Resources, Socorro, N. M., 1947. 146 pp.

Petroleum engineers, geologists, and oil operators interested in Eddy County will find this mimeographed report full of valuable detailed information. In addition to a brief summary of the salient production and geological data for the pool, a vast amount of detail is given, in many cases for each individual well. Well location, total depth, pay depths or intervals, oil-string and tubing depths, acidizing or shooting data, surface elevation, and pressure figures on repressured areas are given for many pools, and often individual well production, by years and cumulative.

PRACTICAL ACCOUNTING FOR OIL PRODUCERS. By Robert L. Pitcher. Published by Mid-West Printing Co., 423 East Fourth Street, Tulsa. 656 pp. $15.

This book, first published in 1938, has been revised, and the contents increased by nearly 300 pages. The new material consists in the main of an interesting presentation of examples and specimen voucher entries graphically and explicitly to portray the handling of accounting for such vital information as the problems faced under "free well" agreements; how a record of oil and gas depletion is set up for each producing property; how the "depreciation ledger" should be kept, and the purpose of using an "outside interest" ledger when it is only an intermediate record.

The author is currently teaching this subject at University of Tulsa. His experience in the field of oil producing has been gained during 24 years of practical application of accounting in the industry. He is an oil-company executive and a practicing accountant.

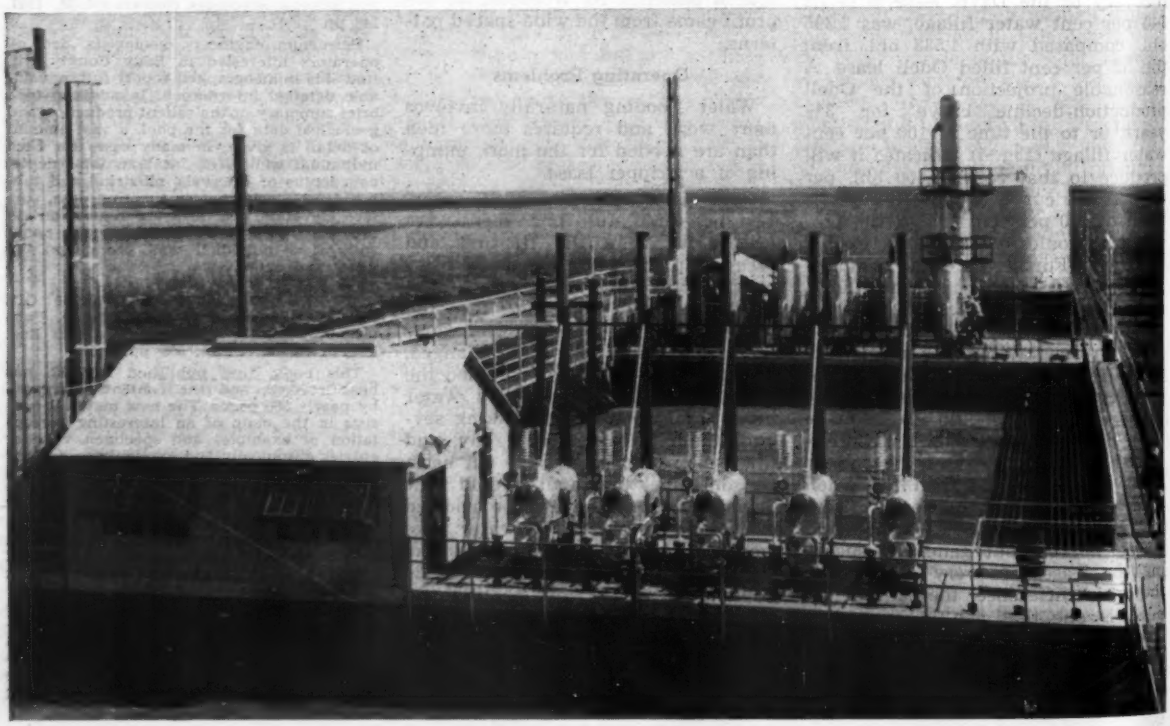
Gas Dehydration at Pecan Island

by E. H. Short, Jr.

IN the Pecan Island gas field, located in the coastal marsh of Vermilion Parish southwest of Abbeville, La., Humble Oil & Refining Co. recently completed one of the most modern gas-dehydration plants ever installed on the Gulf Coast.

This gas field was discovered by Humble in February 1943 and since that time five wells have been completed. Four of these wells are producing from depths below 10,000 ft., and one well is producing from a 7,400-ft. sand. At the present time one well is being drilled and two more will be drilled in the near future. The gas wells in this field are completed in the conventional manner, each being equipped with 2½-in. tubing and packer. Tubing-head well pressures range from 3,000 to 4,000 psi.

Fig. 1—(Above) Humble's plant at Pecan Island field. Located in the marsh land southwest of Abbeville, La., the entire plant was constructed on piling some 8 ft. above the ground. Tank battery at right is for condensate produced with the gas. In middle foreground is diethylene glycol contactor. Fig. 2—(Below) General view of plant. Gas enters through individual lines from each well and goes into heaters shown in foreground



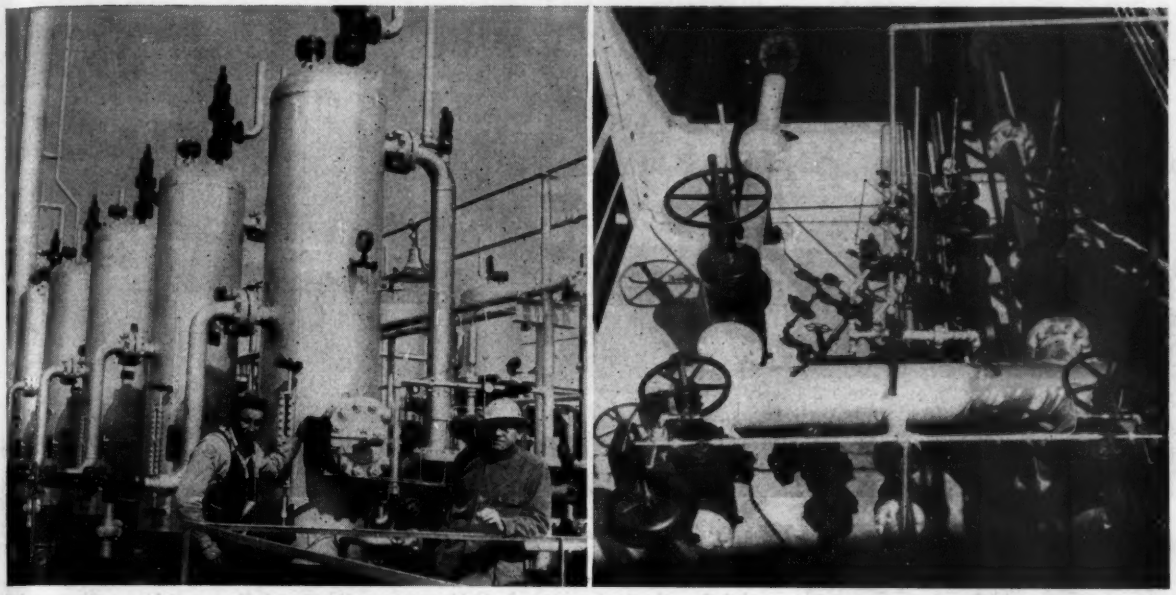


Fig. 3—(Left) Battery of 500 to 125-lb. stage-reduction separators where condensate is trapped. The man is A. H. Townsend, Humble farm boss of Avery Island district. Fig. 4—(Right) View from top of contactor shows meter run for measuring outgoing dry gas

The entire separation plant, with storage tanks and gas-metering equipment, is constructed on a piling platform approximately 8 ft. above the ground. At the present time the volume of gas dehydrated by the plant ranges from 15 to 40 million cubic feet per day. The maximum capacity of the plant is 50 million cubic feet per day. Tests conducted by Humble shortly after the plant was placed in operation showed that 1,250 lb. of water was removed when a daily gas volume of 45 million cubic feet passed through the system.

The five gas wells are produced through individual high-pressure lines to the plant. The flow is controlled at the plant by adjustable chokes (which reduce pressure to approximately 1,800 psi.) located immediately ahead of the individual flow-line heaters and also immediately ahead of the individual 1,000-lb. w.p. separators. Gas from each well is metered before it passes into the glycol contactor where it is dried.

The flow-line heaters are the standard indirect-heating type equipped with 2-in. 5,000-lb. w.p. tubes. Themostatically controlled, the water bath is maintained at a constant temperature.

Condensate produced with the gas is staged through 500 to 125-lb. separators and then goes to the tank battery consisting of two 10,000-bbl. floating-roof tanks and a 1,500-bbl. test tank. The condensate is transported from the plant by barge.

Gas can be delivered from the plant at pressures up to 1,000 lb. to the Interstate Oil Pipe Line Co. 14-in. pipe line which runs from the Pecan Island plant for a distance of about 65 miles to the Opelousas junction where it connects into the Interstate West Baton Rouge line.

Removal of the water from the gas is accomplished by bringing the gas into intimate contact with diethylene glycol. This chemical is a clear, viscous liquid at ordinary temperatures and has a strong affinity for water. Actual separation of the water is accomplished in the contactor shown at middle foreground in Fig. 1.

Gas enters the contactor at its base from a 10-in. wet-gas header. In the first stage it goes through a scrubber, located in the bottom of the contactor, which scrubs the gas of free water and condensate. This liquid is automatically dumped into the discharge line.

In the second stage the gas passes upward through a chimney plate and thence on through standard bubble-cap plates where it contacts with the solution. The extremely fine mist thrown up by the bubble plates is consolidated when the gas passes through a bed of expanded-metal lath.

In the third stage of dehydration the gas enters a second scrubber located in the top of the contactor shell. Traces of glycol are scrubbed out and the gas is delivered to the pipe line through the outlet dry-gas header.

The glycol solution accumulates in the chimney tray after absorbing water vapor from the gas. This diluted glycol solution is bled off from the tray by a pilot-operated liquid-level controller and passes to a heat exchanger where the glycol solution is cooled to 130° F. It then passes to the suction of the solution pumps. In order to take care of variation in volume of the circulation solution a surge tank, open to the atmosphere, is connected to the header. By this means an adequate supply of makeup is available at all times.

In the heat exchanger the cold solution enters at about 90° F. and is heated to 280° F. by absorbing heat from the hot dried solution from the still which is cooled from 320° to 130° F.

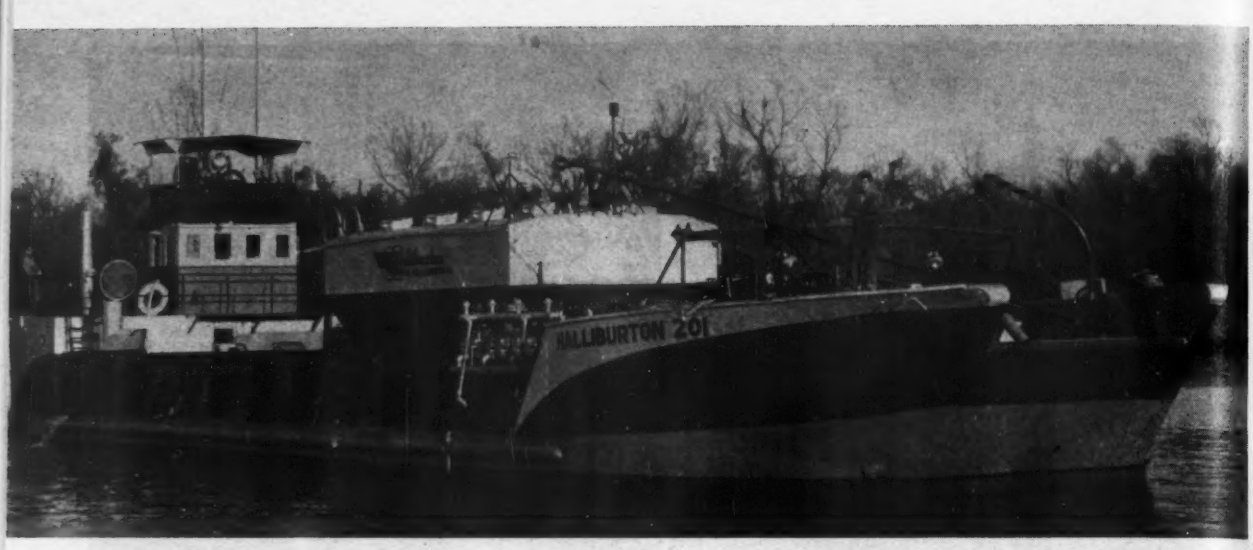
The heated dilute solution from the exchanger enters the still and passes downward through two bubble-cap plates into the base of the still where it is heated to 320° F. At this temperature nearly all of the water is driven out of the glycol so that the solution is ready for reuse after being cooled. The hot dried solution is drained from the base of the column by means of the liquid-level controller which operates its diaphragm valve on the outlet of the hot side of the heat exchanger.

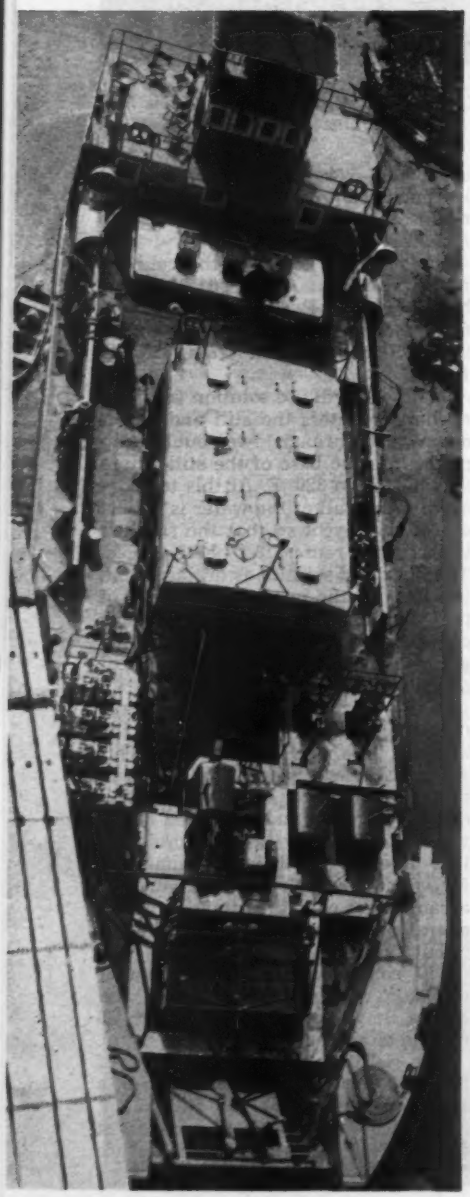
A flow recorder is provided to record the rate of flow through the solution line to the contactor. This recorder is equipped with a special on-off pilot which operates a small diaphragm valve and sounds an alarm whistle if the flow through the solution line falls below the minimum for which the instrument is set. This arrangement calls the attention of the operator to any inadequacies in the circulation rate.

The contactor may be operated at a maximum pressure of 1,000 psi. and has a normal gas capacity of 50 million cubic feet of gas per 24 hours.

The still operates at a pressure of 3 psig. on the outlet vapor, with a base temperature of 320° F.

The Dowtherm boiler operates at from 0 to 5 psig. vapor temperature 500° to 520° F.





The view above shows the Halliburton 201 on trial run in intercoastal canal near Harvey, La. At left is seen a view of the barge from derrick monkey board of Danciger rig at the California Co. 2 Lepine, in a waterway near Barataria. At aft end are pilot house, quarters, and, below, the engine room. Amidships are two V-bottom bulk cement bins, with capacity of 1,000 sacks each. Forward is the cementing equipment. All photographs by O. B. Dillon, Halliburton staff photographer

Self-Propelled CEMENTING BARGE *for Offshore Operations*

by Neil Williams

FIRST of a fleet of self-propelled oil-well cementing barges designed for use at offshore locations along the Louisiana and Texas Gulf Coast recently has been placed in operation by Halliburton Oil Well Cementing Co. Based at Harvey, on the intracoastal canal across the Mississippi River from New Orleans, the initial barge is scheduled to operate in and out of Lake Salvador, Bayou Perrot, Lafitte, Barataria, and other fields in the southeastern Louisiana marsh region. Additional similar barges, as assembled, will be stationed at other convenient central points along the coast.

Cementing jobs on offshore operations in the past have been performed with land-based motorized equipment transported to well locations on conventional flat-deck barges. An innovation in maritime work, the cementing barge has been designed to provide safer and more convenient handling of equipment and more adequate facilities than possible with truck-mounted units. All equipment is permanently installed and includes both steam and diesel-engine-driven pumps. The complete assembly is the equivalent in power and capacity of more than three of the usual type of land-based cementing trucks.

Development of the barge-mounted cementing assembly also brings with it the first adaptation of bulk-cement handling methods to offshore oil operations. Although employed extensively in inland oil fields, bulk-cement handling heretofore has not been available to maritime locations because of the difficulties of transporting and accommodating on conventional barges the large amount of additional necessary equipment involved in bulk cementing. The cementing barge carries two bulk-cement bins, each having a capacity equivalent to 1,000 sacks.

The barge used in the initial assembly is one of the eight LCT boats

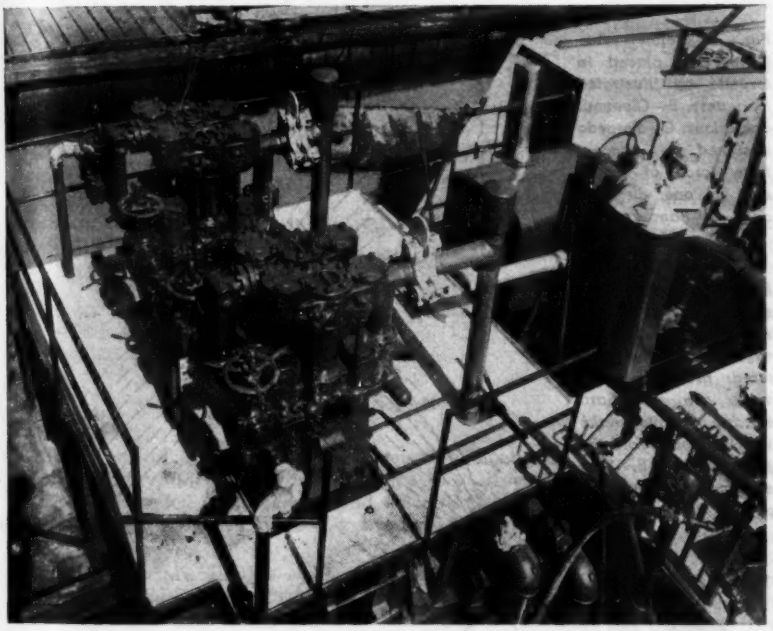
purchased by the Halliburton company for conversion to cementing units or bulk-cement transports. It is propelled by three screws driven by the same number of 165-hp. marine diesel engines. It has an over-all length of 112 ft., a beam of 32 ft., and an average draft of 3½ ft., making it navigable in most any of the numerous waterways which traverse the coastal region and anywhere it is possible to use a drilling barge. One of the LCT's, the largest, having a length of 161 ft., is being converted to a bulk-cement transport barge which will supply central distributing points along the intracoastal canal from New Orleans to Corpus Christi.

On the first barge, the two large V-bottom bulk-cement bins are installed amidship. Cementing equipment, including pumps, measuring mixing tanks, and control hookup, is mounted on the bow. Located aft are the pilot house and quarters for a six-man crew, with the engine room below. The crew consists of two cementers, the "skipper," and engineer, a deck hand, and a cook.

Cement-pumping facilities include two Howco vertical, duplex double-acting piston-type pumps with 4-in. liners and 10-in. stroke, each driven by a General Motors 4-71 100 hp. diesel engine through a five-speed heavy-duty transmission; one Howco horizontal-type duplex double-acting 4 by 10-in. pump, driven by a GM 3-71 diesel engine delivering 75 hp. through a four-speed transmission; and four Howco S-12 12 by 4 by 12-in. duplex double-acting steam-driven piston pumps.

Discharge pressure of the two vertical, power-driven pumps is rated at more than 7,000 psi. each. These pumps are capable of mixing and handling cement at the rate of approximately 25 sacks per minute. Both can be used to pick up cement at which time the mixing volume would be approximately 35 sacks per minute. They are located on the port side of the bow. The horizontal power pump, located near the center of the bow just back of the two 20-bbl. measuring tanks for water, normally is used for mixing pressure on the hydraulic mixer.

The four steam pumps, located on the starboard side of the bow, can be compounded in line to operate above 9,000 psi. with 300 psi. steam pressure. They are for use only on steam rigs since no boiler facilities are provided on the barge. They are capable of mixing and pumping cement slurry into a well at a rate in excess of 40 sacks a minute. With two of them running in parallel, the unit is capable of handling fluid at 480 bbl. per hour.



Arrangement of Manifolding

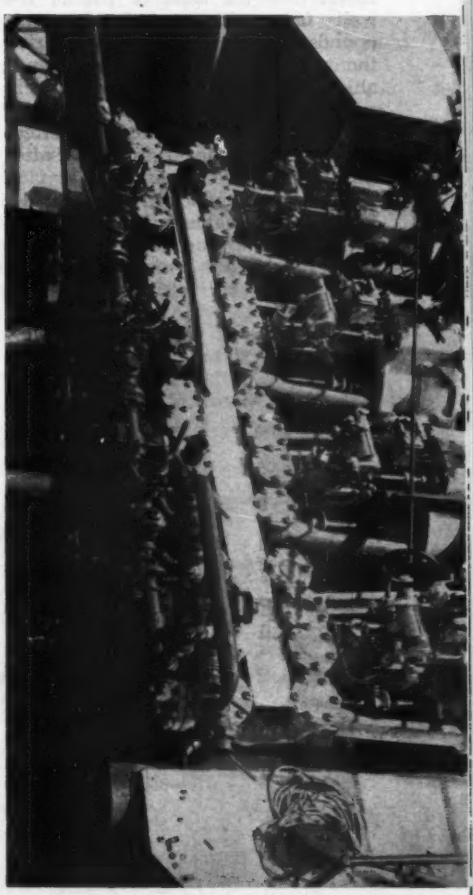
Manifolding is arranged so that the pumps may be operated individually, in parallel, or in compound as may be required. It has been designed for maximum flexibility of control to accommodate both the usual and abnormal service conditions. All controls are centralized at a convenient point where the operator may observe every operating unit at all times. They and the operating mechanisms are arranged for maximum safety and speed of operation.

In mixing operations, delivery of cement to the hopper is completely mechanical. Screw-type conveyors carry cement from the two V-bottom bins located amidship to the main mixing tub below the main deck. Release of the cement into the conveyor channels is controlled by hydraulically operated baffles in each of the eight 250-sack compartments in the bins. Bins and compartments are fully protected from weather to prevent the cement from lumping or setting up prematurely so it can be fed to the hopper for uniform mixing.

Spacious quarters in the stern include modern facilities for preparation of meals, steel lockers for the crew, comfortable beds, radio, deck chairs and other conveniences. Radiotelephone is provided for two-way communication between the barge and its base.

The maiden job, on which the accompanying pictures were taken, was at California Co. 2 Lepine, located in a waterway near Barataria, about 25 miles below Harvey. It involved pumping 500 sacks for a long string of casing.

(Left) Looking to port side from top of bulk cement bins, showing the vertical pumps, each driven by a 100-hp. diesel engine. (Below) Looking to starboard side from top of bulk cement bins, showing the four steam pumps



New Oil-Well Shooting Method

Utilizes the "Shaped Charge" Principle

A NEW technique of oil-well shooting has been developed by James Murphy of Solon, Ohio, who studied at the Edwy R. Brown school of petroleum, Marietta College, Marietta, Ohio, until February, when he completed work for a bachelor of science degree.

Murphy's application of explosives to oil-field use grew out of his Army experience with the "shaped charge" or "directional explosive" which proved so devastatingly effective in reducing enemy concrete fortifications to rubble during the war.

In order better to utilize the force of the explosives, the new technique confines the explosion to the desired portion of the productive formation. Heretofore the shots have been "tamped" with oil and/or water. This has not been entirely successful.

If the shot is to be successful, it must be sharp and penetrating. The energy must be translated into violent action rather than intense heat which might fuse the sand or plaster the well face with undesirable compounds, sometimes seriously injuring the well. The shot must be dependable, avoiding partial detonation or in some cases complete failure to detonate under given conditions. An effective shot would make the well "after flow" and hence "clean itself."

With the introduction of core drilling much valuable information was gathered regarding sand conditions. Consequently different problems confronted the oil and gas producers. "Selective shooting," or shooting certain strata violently without disturbing adjacent formations, was the problem. Selective shooting, spaced shots, and various kinds of tamping still leave a big question mark. The producer still asks, "How can we direct and control the force of explosives we put into a well?"

Collaborating with C. C. Hogg, head of the petroleum school, whose engineering ability and experience as a producer proved invaluable, Murphy made the plans and conducted experimental research. Then actual field tests were completed with the cooperation of Petroleum Explosives Co., Oil City, Pa., and Producers Torpedo Co. of Marietta, Ohio. Various oil producers have helped in testing and demonstrating the features of this new type of shot.

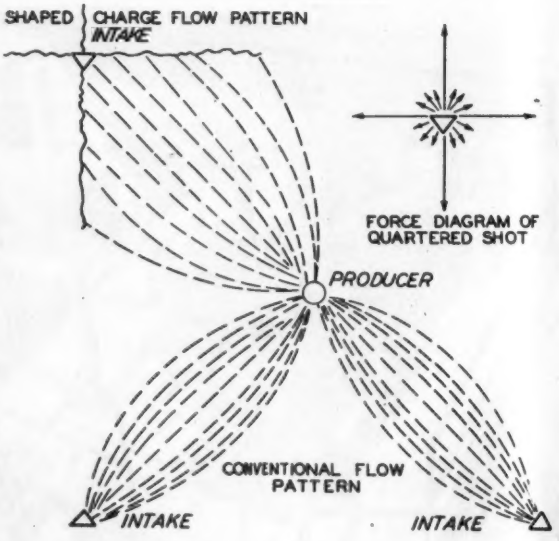


Fig. 2—(Right) For five-spot secondary-recovery operations, force of explosion may be quartered; pressure-intake wells are shot hard toward opposite intake well, lighter toward the producing well, thus evening up pressure pattern

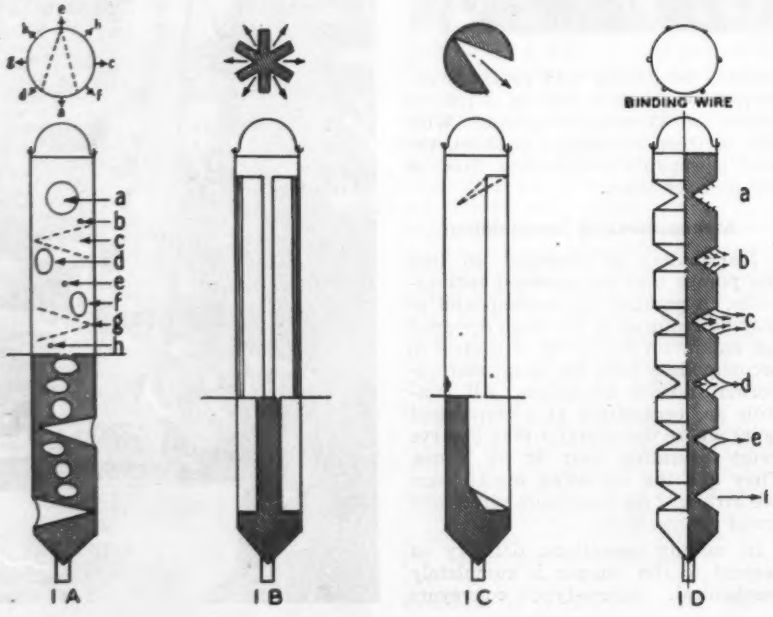


Fig. 1—(Below) A—Cones are placed in torpedo as illustrated by letters. B—Cleanout operations. C—Torpedo designed to concentrate force of explosion in one direction only. D—Pancake shot

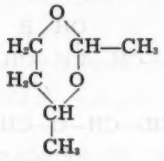
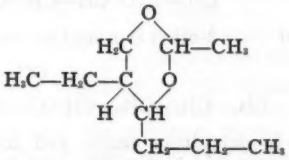
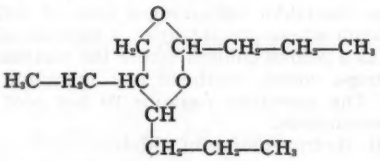
Applying the basic principle that an explosive acts perpendicular to its surface, a shell was designed using cones as the shape for the shot. With the conical shape it is believed possible to direct approximately 70 per cent of the force of the explosion in one direction along the axis of the cone, which in this case is the resultant or focus of the explosion.

When the explosive is designed to concentrate the force gathered in each individual cone at different horizontal angles in different strata, the total effect is a breaking and shattering, rather than a pulverizing action as is experienced with conventional shot. From a cylindrical tin shell the force pushes equally over all the surface of the sand in all directions. Shells designed in the new manner (Fig. 1-A) are the most powerful and effective yet experienced for a given amount of explosives.

(Continued on page 98)

CHEMICALS from PETROLEUM

(Continued from page 77)

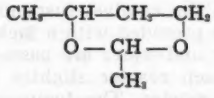
Starting material	Product	Boiling Point, °C.
Acetaldehyde and ethanol	Diethyl acetal $H_3C—CH<(OC_2H_5)_2$	103
Acetaldehyde and 1,3-butylene glycol	2,4-dimethyl, 1,3-dioxan 	150 est.
Acetaldehyde and 2-ethyl, 1,3-hexandiol	4,5-diethyl, 2-methyl 1,3-dioxan 	220 est.
Butyraldehyde and butanol	Dibutyl butyral $H_3C—CH_2—CH<(OC_4H_9)_2$	200
Butyraldehyde and 2-ethyl, 1,3-hexandiol	2,5-diethyl, 4-butyl 1,3-dioxan 	240 est.

Diethyl acetal is formed by the reaction of acetaldehyde with ethyl alcohol in the presence of a trace of acid. The unreacted acetaldehyde and alcohol, after neutralizing the acid, are recovered by fractionation and recycled.

The acetals are liquids with ether-like properties, fairly stable to alkaline hydrolysis but unstable to acids. They can be used generally as solvents. The cyclic acetals, dioxolane and dioxanes, have been used to prepare resins. The cyclic acetals are fairly stable and have solvent properties similar to dioxane.

The acetals are prepared easily and in good yields.

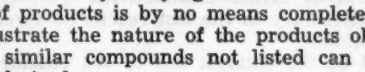
In a number of instances, products made from the starting materials in one or more operations could be reacted with the original reactants in a new series of operations. For instance, 1,3-butylene glycol, made through operations 3A and 2B, cauld be condensed with acetaldehyde by operation 2A to give 1,3-butylene glycol acetal.

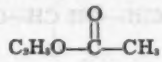
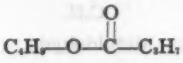
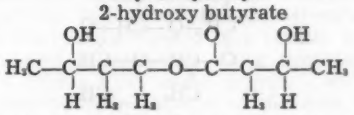


In such instances the number of operations required would be determined by studying the flow sheet.

The list of products is by no means complete, but it serves to illustrate the nature of the products obtained. Many other similar compounds not listed can also be prepared, if desired.

6A. Tischtschenke condensation of aldehydes to esters:



Aldehyde used	Product	Boiling point
Acetaldehyde	Ethyl acetate 	77
Butyraldehyde	Butyl butyrate 	166
Acetaldol	3-hydroxy butyl 2-hydroxy butyrate 	

This reaction is a general one for aldehydes but has not been commonly applied to manufacturing processes probably because of the difficulty in preparing catalysts.

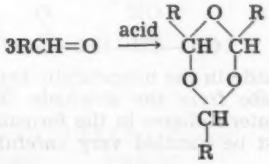
The reaction of two molecules of acetaldehyde to form ethyl acetate takes place in the liquid phase below room temperature in the presence of aluminum ethylate. Aluminum ethylate solution in ethyl acetate is prepared batchwise in a steel vessel equipped with a stirrer, reflux condenser and heating coils. A mixture of aluminum borings, aluminum chloride, and ethyl acetate is heated to the boiling point, at which point the addition of absolute ethyl alcohol is started. Addition of the alcohol is continued over a period of 8-10 hours and reflux continued for 24 hours. The aluminum reacts completely to aluminum ethylate.

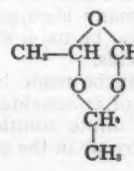
Equal weights of catalyst solution and anhydrous acetaldehyde are charged continuously to a brine-cooled reactor. The overflow from the first reactor goes to a second reactor maintained at a slightly higher temperature to complete the reaction. Since the catalyst is not recoverable, the reaction product is treated in an evaporator with enough water to hydrolyze it to aluminum hydroxide and ethanol. The evaporator separates the liquids from the aluminum hydroxide.

The purification system consists of four columns, the first of which fractionates off the unreacted acetaldehyde. The second column fractionates off the ternary ethanol-ethyl acetate-water azeotrope which is sent back to the evaporator where the water reacts with the unused catalyst. In the third column the overhead product is the binary azeotrope, ethanol-ethyl acetate, which is used for catalyst preparation. Finished ethyl acetate is the overhead product of the last column.

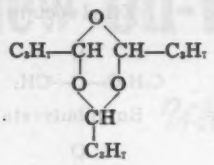
Mixtures of mixed esters can also be prepared by using a mixture of aldehydes as the reacting materials. For example, by condensing acetaldehyde and butyraldehyde together a mixture of esters would be formed containing ethyl acetate, butyl acetate, ethyl butyrate and butyl butyrate.

8A. Aldehyde condensations catalyzed by acids:

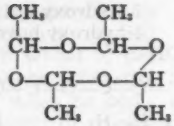


Aldehyde condensed	Product	Boiling point
Acetaldehyde	Paraldehyde 	124°

Butyraldehyde	2,4,6-tripropyl, 1,3,5-trioxan	100° 35 mm.



Acetaldehyde	Metaldehyde	Dec. 100°

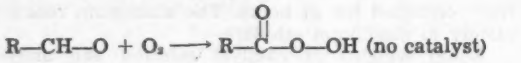


In acid media the simpler aldehydes are known to go to their corresponding trimers in good yields. Acetaldehyde will also form a tetramer at low temperature.

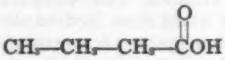
The compounds are unstable to acid or alkali and regenerate the aldehyde. For this reason they are often a good source of the anhydrous aldehyde and are easier to handle because of their lower volatility and stability. Trioxane is particularly useful as an anhydrous source of formaldehyde, because pure formaldehyde cannot be handled as a stable liquid.

Acetaldehyde is converted to paraldehyde by a trace of acid. The unreacted acetaldehyde can be fractionated off after neutralizing the acid.

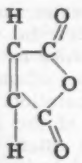
9A. Oxidation of aldehydes:



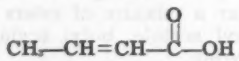
Aldehyde oxidized	Product	Boiling point
Butyraldehyde	Butyric acid	163°



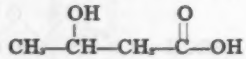
Crotonaldehyde	Maleic anhydride	202°



Crotonaldehyde	Crotonic acid	185°



Acetaldol	B-hydroxy butyric acid	Dec.



Peracids made in the noncatalytic oxidation are difficult to separate from the aldehyde. They have been shown to be intermediates in the formation of the acids, and they must be handled very carefully to avoid explosions.

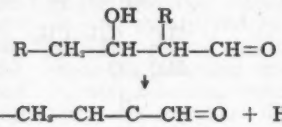
The unsaturated aldehydes have been oxidized to the corresponding acids, but the yields, in general, are not as good. Their conjugated double bonds make them useful intermediates for many chemical syntheses.

The aldols might also be oxidized under certain conditions to 3-hydroxy acids.

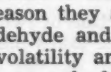
Maleic anhydride can be made in good yields by the vapor phase oxidation of crotonaldehyde.

Acetaldehyde, as a dilute solution in acetic acid, is oxidized to acetic acid by air in the presence of a catalyst. Temperature control is obtained by recycling a large portion of the reaction product through water cooled exchangers. The reactor product is fed into a column where unreacted acetaldehyde, water and low-boiling impurities are distilled overhead. The residue from this column is then fractionated to separate the pure product from catalyst and high boilers. The acetaldehyde vapor in the air from the reaction is removed by absorption in water. Acetaldehyde is then stripped from the aqueous solution in the usual manner.

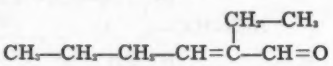
1B. Dehydration of aldols:



Starting material	Product	Boiling point
Acetaldol	Crotonaldehyde	102°



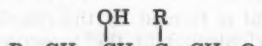
Butyraldol	2-ethyl 3-propyl acrolein	180° est.



The aldols dehydrate easily and in good yields to give unsaturated aldehydes. The unsaturated aldehydes are useful intermediates and may be made to polymerize with peroxide catalysts. Since they can be made so easily, work on their polymerization may be worth investigation.

Acetaldol readily dehydrates to crotonaldehyde under the influence of heat in the presence of traces of iodine. Acetaldol containing a trace of iodine is fed into a column where acetaldehyde is distilled off. The residue goes to a second column where the crotonaldehyde-water azeotrope comes overhead and inorganic salts out the base. The azeotrope contains 80 per cent by weight of crotonaldehyde.

2B. Hydrogenation of aldols:



Starting material	Product	Boiling point
Acetaldol	1,3-butylene glycol	207°
Butyraldol	2-ethyl, 1,3-hydroxy hexane	270° est.

The aldols hydrogenate in good yields to glycols. The products are useful for making plasticizers, resins, explosives, solvents and as chemical intermediates.

Acetaldol is hydrogenated to 1,3-butylene glycol at 800 psi. and temperatures ranging from 120° to 230° F. in the presence of nickel catalyst. The reaction is carried out continuously in a series of tall small-diameter reactors by passing acetaldol with catalyst in suspension cocurrently with a large excess of hydrogen. After cooling the product from the last reactor, the excess hydrogen is separated and recycled to provide the agitation necessary to keep the catalyst suspended.

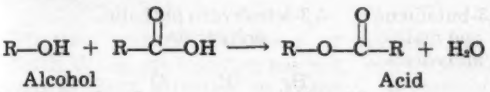
Each reactor is provided with a jacket through which mixtures of steam and water are passed to maintain the temperature of each reactor slightly higher than that of the preceding reactor. The temperature in the first reactor must be kept low because the high acetaldol concentration favors crotonization. A higher temperature is necessary in the last reactor to complete the hydrogenation.

Most of the catalyst fed to the reactors is that recovered from the hydrogenated product by settling and filtration. The makeup catalyst is freshly prepared by treating powdered nickel-aluminum alloy with caustic soda and then washing with water.

The hydrogenated product contains, in addition to

1,3-butylene glycol, ethanol from hydrogenation of acetaldehyde in the acetaldol feed and butyl alcohol from crotonization and hydrogenation of acetaldol. The purification system consists of an ethanol column, butanol column and two glycol columns. The ethanol is fractionated from the hydrogenated product in the ethanol column. Butanol and water are then fractionated from the mixture in the butanol column. The residue from the butanol column is then distilled in the glycol columns under vacuum, leaving as a residue the higher boiling compounds formed as a result of side reactions in the aldoling process.

4B. Esterification:

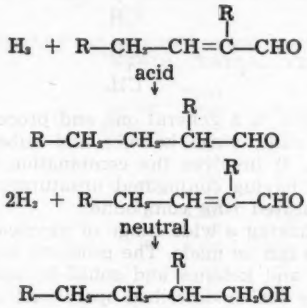


Alcohol	Acid
1,3-butylene glycol	acetic acid
2-ethyl, 1,3-hexane diol	butyric acid
butanol	crotonic acid
ethanol	2-ethyl 3-propyl acrylic acid
	maleic acid
	tetra hydro phthalic acid

Ethyl acetate is produced by the reaction of acetic acid with ethanol in the presence of sulfuric acid which catalyzes the reaction. The reaction mixture is fed into a fractionating column from which the ternary azeotrope of ethanol-water-ethyl acetate comes overhead.

This distillate is diluted with water which causes two layers to separate, the top being nearly pure ethyl acetate. The bottom which is dilute ethanol is separated in a second fractionation.

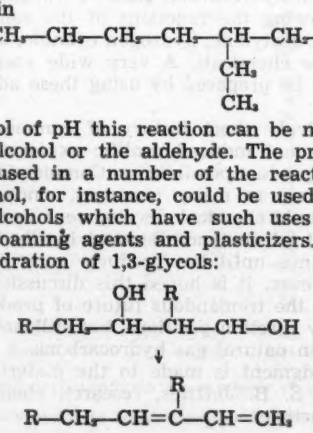
1C. Hydrogenation of substituted acroleins:



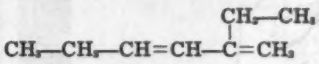
Starting material	Products	Boiling point, °C.
Crotonaldehyde	Butyraldehyde	75.7
Crotonaldehyde	1-butanol	117.7
2-ethyl, 3-propyl acrolein	2-ethylhexanol	183.5

By control of pH this reaction can be made to yield either the alcohol or the aldehyde. The products listed could be reused in a number of the reactions already listed. Butanol, for instance, could be used as a source of higher alcohols which have such uses as flotation agents, antifoaming agents and plasticizers.

2C. Dehydration of 1,3-glycols:



Starting material	Product	Boiling point
1,3-butylene glycol	Butadiene	1°
2-ethyl, 1,3-hydroxy hexane	2-ethyl, 1,3-hexadiene	100° est.



The formation of butadiene by the dehydration of 1,3-butylene glycol has been studied extensively. Other 1,3-glycols may be dehydrated in a similar manner. The dienes are used in the Diels Alder synthesis of cyclic compounds. Dienes form useful polymers and are useful chemical intermediates because of the ease with which they add with compounds having an active hydrogen.

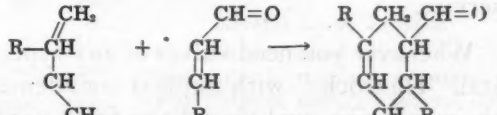
One, three-butylene glycol is dehydrated to 1,3-butadiene in the vapor phase at atmospheric pressure and about 500° F. in the presence of catalysts. The reaction absorbs heat. Glycol and recycled butadiene are fed into a gas fired furnace where the glycol is vaporized and the butadiene and glycol vapors superheated to the reaction temperature. The reactors are fintube exchangers in which the heat absorbed by the reaction is furnished by hot inert gas passing through the fintubes. Catalyst is deposited on the fins.

By so conducting the reaction, the temperature drop is minimized. This is desirable since the highest yield is obtained within a small temperature range. Too low a temperature causes a low reaction rate while the upper temperature is limited by the polymerization of butadiene to oil.

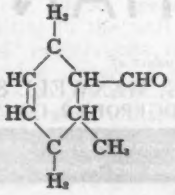
The vapors from the reaction are cooled to room temperature which causes the unreacted glycol, butenol, water, and oil to condense. Most of the butadiene is recycled to the reactor for purposes of dilution. The butadiene product is finally washed with water to remove traces of aldehydes and then liquefied by compression. The butadiene is then fractionated at 100 psig. from higher-boiling impurities always present in very small amounts.

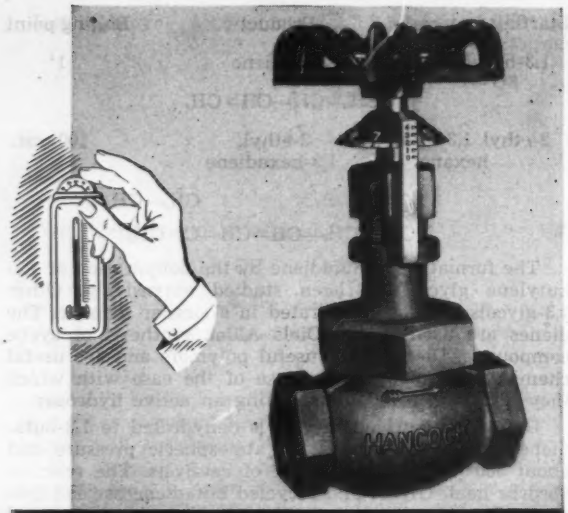
The products condensed from the reaction vapors are fed into a vacuum column where oil, water, and butenol are fractionated from the unreacted glycol, which is then fractionated under vacuum from high-boiling material. The mixture of oil, water, and butenol is washed with water in a disk-and-ring extractor to recover the butenol from the oil. Butenol is fractionated from the aqueous solution and returned to the reactor since it is an intermediate product of the over-all reaction.

1D. Diels Alder condensation:



Starting material	Product	Boiling point, °C.
1,3-butadiene and crotonaldehyde	1,2,3,6-tetrahydro 1-methyl benzaldehyde	79 (10)





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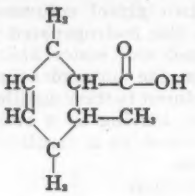
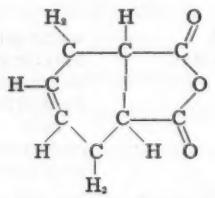
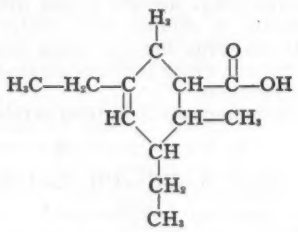
Starting material	Product	Boiling point, °C.
1,3-butadiene and crotonic acid	1,2,3,6-tetrahydro 2-methylbenzoicacid	



1,3-butadiene and maleic anhydride	Δ 3-tetrahydro phthalic anhydride	



2-ethyl, 1,3-hexadiene and crotonic acid	1,2,3,6-tetrahydro, 2-methyl, 3,5-diethyl benzoic acid	



This reaction is a general one and proceeds with the unsaturated acids, vinyl ketones and substituted acroleins as well. It involves the combination of two compounds, both having conjugated unsaturation, to give a singly unsaturated ring compound.

Products having a wide range of physical and chemical properties can be made. The products are cyclic aldehydes, acids, and ketones and could be used over in a number of the earlier described operations.

Butadiene can be made to react with crotonaldehyde by passing a mixture of the two through a reactor at about 100° C. About 30 per cent of the reactants are converted to 5-methyl-Δ^5-tetrahydrobenzaldehyde. The unreacted butadiene is condensed from the vapor phase by cooling and is then recycled. The unreacted crotonaldehyde is distilled from the product and recycled.

All of the materials used in the illustrations above are produced from hydrocarbon gases. Flow sheets could be prepared showing the reactions of the same chemicals with ketones, acetylene, hydrogen cyanide, ammonia and other reactive chemicals. A very wide variety of compounds could be prepared by using these additional materials.

The relatively short history of commercial organic synthesis has not induced prolific exploration into the multitude of product possibilities. Commercial encouragement is lacking in many instances, since the present basis for organic chemical development usually depends on the industrial demand. Demand hardly ever reaches real significance until the products enter the low cost market. However, it is hoped this discussion will serve to emphasize the tremendous future of products occupying secondary reaction positions, but still having as their primary origin natural gas hydrocarbons.

Acknowledgment is made to the material assistance provided by S. B. Jeffries, research chemist, in preparing this article.

INVENTORY OF GAS-DRIVE PROJECTS —In North Texas

by L. F. Peterson

WITH the possible exception of North Texas, gas injection has not received as much attention in Texas as it has in some of the older oil-producing states, such as Pennsylvania, since the crude supply has easily matched the demand through successive discoveries of flush production in new fields. In the area under discussion there are many small gas-injection projects and a few large projects, which are operated on a field-wide basis or in a large portion of the field. The small projects included in this paper are all relatively young, having commenced within the last 10 or 15 years. A few projects have been initiated in this area at an earlier date but have been discontinued. The larger projects are all comparatively recent.

In most of the smaller projects, the gas produced on the lease is injected although some makeup gas is purchased. A small compressor is used to gather the casing-head gas and compress it to sufficient pressure to return it to the formation. In a few instances gas is obtained from outside sources at sufficient pressure for injection without compression. As a general rule old producing wells are used as input wells. Many of these small projects were started after the primary production had declined to a point where it was no longer profitable to operate the property and many of these properties would have been abandoned, without the application of gas injection to stimulate production. A review of production curves on some of the properties, on which gas injection operations have been conducted, reveals that they are producing as much oil today as they were 5 or 6 years ago. Varying degrees of success have been obtained with the projects now in operation and many less successful programs have been abandoned. No effort has been made to develop data on ultimate recoveries to be expected as a result of gas injection.

L. F. Peterson is chief petroleum-engineering supervisor in the general office of Stanolind Oil & Gas Co., at Tulsa. Prior to this post, he was petroleum engineer in the Tulsa office and division engineer for the North Texas-New Mexico division in Fort Worth.

Peterson is a Texas A. & M. graduate, with a B.S. in petroleum engineering. He began his business career with Stanolind in June 1936.

This article was delivered as a paper at the spring meeting of the southwestern district, A.P.I. Division of Production, at Fort Worth, March 27-28. A companion article, analyzing gas-drive operations in West Texas and New Mexico, appears on page 94.

TABLE 1—SUMMARY OF GAS-INJECTION OPERATIONS IN THE PANHANDLE AND NORTH CENTRAL TEXAS AREAS

County—	No. of projects	Prod. area (ac.)	No. wells— Prod.	No. wells— Input	Production— Oil (bbl.)	Production— Water (bbl.)	Production— Gas (M.c.f.)	Injection volume (M.c.f.)
Archer	49	2,142	559	145	1,661	1,396	2,535	3,124
No. Proj. Rep.	....	*24	46	47	43	19	37	37
Baylor	3	105	80	20	189	40	83	83
No. Proj. Rep.	....	*2	3	3	3	1	1	1
Brown	9	1,525	171	52	221	15	828	1,261
No. Proj. Rep.	....	3	9	9	8	1	*7	*9
Clay	10	1,404	466	67	916	94	326	189
No. Proj. Rep.	....	10	10	10	8	*8	*8	*8
Coleman	5	160	25	9	343	....	828	179
No. Proj. Rep.	....	2	5	5	5	0	4	*4
Comanche	1	....	33	9	94	110	....	101
No. Proj. Rep.	....	0	1	1	1	1	0	1
Cooke	13	580	208	37	1,079	275	289	254
No. Proj. Rep.	....	9	13	13	13	7	10	11
Eastland	3	1,080	61	23	677	292	1,852	1,812
No. Proj. Rep.	....	1	3	3	3	1	3	3
Gray	5	11,920	940	81	11,372	....	11,621	7,860
No. Proj. Rep.	....	3	5	5	5	....	2	5
Hutchinson	1	....	3	3	....	....	197	197
No. Proj. Rep.	....	....	1	1	....	....	1	1
Jack	7	535	41	10	202	4	2	4
No. Proj. Rep.	....	6	6	6	5	1	1	1
Jones	11	645	116	23	691	26	560	250
No. Proj. Rep.	....	5	11	11	8	6	9	*8
Montague	7	2,415	109	11	3,563	625	4,766	2,720
No. Proj. Rep.	....	7	7	7	6	6	6	7
Shackelford	6	245	83	13	286	70	129	143
No. Proj. Rep.	....	3	6	6	3	1	3	4
Stephens	2	....	30	2	80	....	142	59
No. Proj. Rep.	....	0	2	2	2	0	2	2
Throckmorton	1	30	4	1	21	4	25	15
No. Proj. Rep.	....	1	1	1	1	1	1	1
Wheeler	3	....	1	4	....	....	20	20
No. Proj. Rep.	....	....	1	3	....	....	2	2
Wichita	42	5,850	1,885	201	14,479	1,165	50,345	14,688
No. Proj. Rep.	....	35	*40	41	39	30	34	37
Wilbarger	12	700	78	62	298	23	397	1,282
No. Proj. Rep.	....	2	*10	*12	*5	1	8	12
Young	24	558	272	65	744	215	1,253	1,390
No. Proj. Rep.	....	10	24	23	*21	*10	20	21
Total	214	29,894	5,165	838	36,917	4,354	76,098	35,630
No. Proj. Rep.	....	*123	*204	*209	*179	*94	*159	*175

*Denotes only partial information available on some projects included in above figure.

Several Large Projects

In North Central Texas and the Panhandle, in addition to numerous small projects, there are several large gas-injection projects which are outstanding examples of cooperative and unitized programs. These operations include West Pampa, Hildreth, and KMA gas-injection projects.

Early in the operation of Hildreth field it became apparent that unitization was necessary to control the reservoir. Three operators agreed on equities in the unit and on July 1, 1945, negotiations for unitizing the working interest were completed. Later 90 per cent of the royalty interests were unitized. There are 53 wells in the working-interest unit and 47 wells in the royalty unit. In November 1944 gas injection into two

input wells was commenced using a 600-hp. compressor to inject 1,500 M.c.f. per day. One of the input wells was low on the structure, while the other was high and approximately 60 per cent of the input volume was injected into the well with the high structural position. A surface injection pressure of 1,500 psi. was required. Since unitization has been completed, gas is being injected into one well on the top of the structure. Approximately 2,500 M.c.f. per day is being injected at a surface injection pressure from 200 to 300 psi. below the reservoir pressure. Approximately one-third of the gas produced has been returned to the reservoir.

Cumulative Volume Injected

At the present time approximately 55 per cent of the produced gas is being returned, with the cumulative volume injected amounting to over 1,000,000 M.c.f. The injected volumes replace approximately 25 per cent of the withdrawals from the field. The flowing characteristic of the wells have very definitely been benefited as a result of gas injection.

There have not been many gas-injection operations in dolomites and limestones and certainly none conducted on the scale of the West Pampa repressuring project. This project covers 11,667 productive acres and includes 26 active producing companies with over 100 different leases. Gas injection at this project commenced on March 25, 1946, with gas being injected into 11 input wells. Today a total of 75 gas-injection wells are in active service and there are 895 producing wells. Articles of agreement, covering the formation of an unincorporated nonprofit association dedicated to the cooperative effort of installing and conducting gas-injection operations in the West Pampa area, were completely executed by all operators on January 13, 1945. An engineering organization was set up by the operators for this project under the direction of a full-time pool engineer. A daily gas-injection rate of almost 8,000 M.c.f. per day is being used, with all of the residue gas available being injected. An agreement between the gasoline plants and the operators provides that the gasoline plants deliver high-pressure residue gas to the lease lines in return for a service charge. The daily oil-producing rate in this area is approximately 11,000 bbl. of oil per day. Increases in oil production have occurred on several leases within the West Pampa area.

Initiation of Program

Gas injection in KMA field was first put into operation during November 1938. It was initiated by several operators having leases in the northwestern part of the field. The injected gas was compressed by a gasoline plant and injected into selected input wells. This small project grew into a program now comprising 2,900 acres, 1,489 producing wells, and 109 injection wells. Due to the large scope of operations the KMA Pressure Maintenance Association was formed. During January 1940 this association employed a chairman to maintain records and make monthly reports on the progress of operations. At the present time 13,700 M.c.f. per day are being injected, with the input pressures ranging from 650 to 1,000 psi.

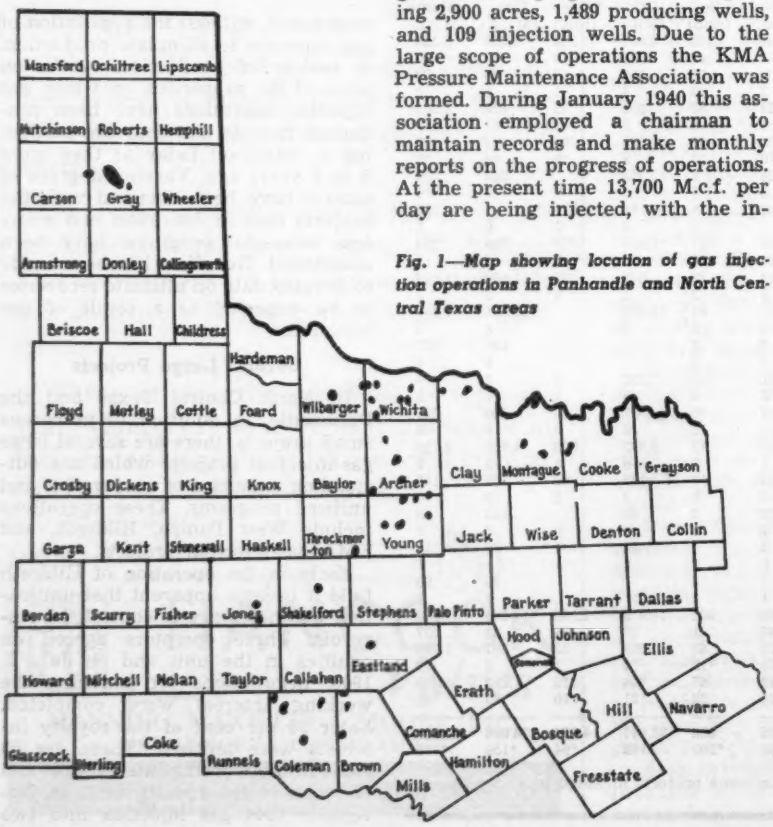


Fig. 1—Map showing location of gas injection operations in Panhandle and North Central Texas areas

All of the data it was possible to develop on gas-injection operations in the Panhandle and North Texas area are summarized by counties in Table 1. It is believed that these data represent a large majority of the gas-injection operations in this area, although it was not possible to obtain complete information on each project. The location of these operations is shown on Fig. 1. A total of 214 different projects are located in 20 counties. The combined area for the 123 programs for which these data were available represents 29,894 acres. Fairly complete information on the number of producing and input wells indicates there are over 5,165 producing wells and 838 input wells included in these gas-injection projects. Almost all of these projects are located in gas-drive fields. The areas of the gas-injection units vary from 10 to 11,700 acres. Injection pressures range from atmospheric to 1,500 psi. while injection volumes vary from 1.2 to 13,700 M.c.f. per day. Depths of these formations vary from 200 to 4,000 ft. Gas was used as the injection medium in all of the projects, with no reports of air being used. On 179 projects for which this information is available, the daily oil production amounted to 36,917 bbl., and for 159 projects in which the data were available 76,098 M.c.f. of gas are produced per day. Information on 175 projects revealed that 35,630 M.c.f. per day are being injected.

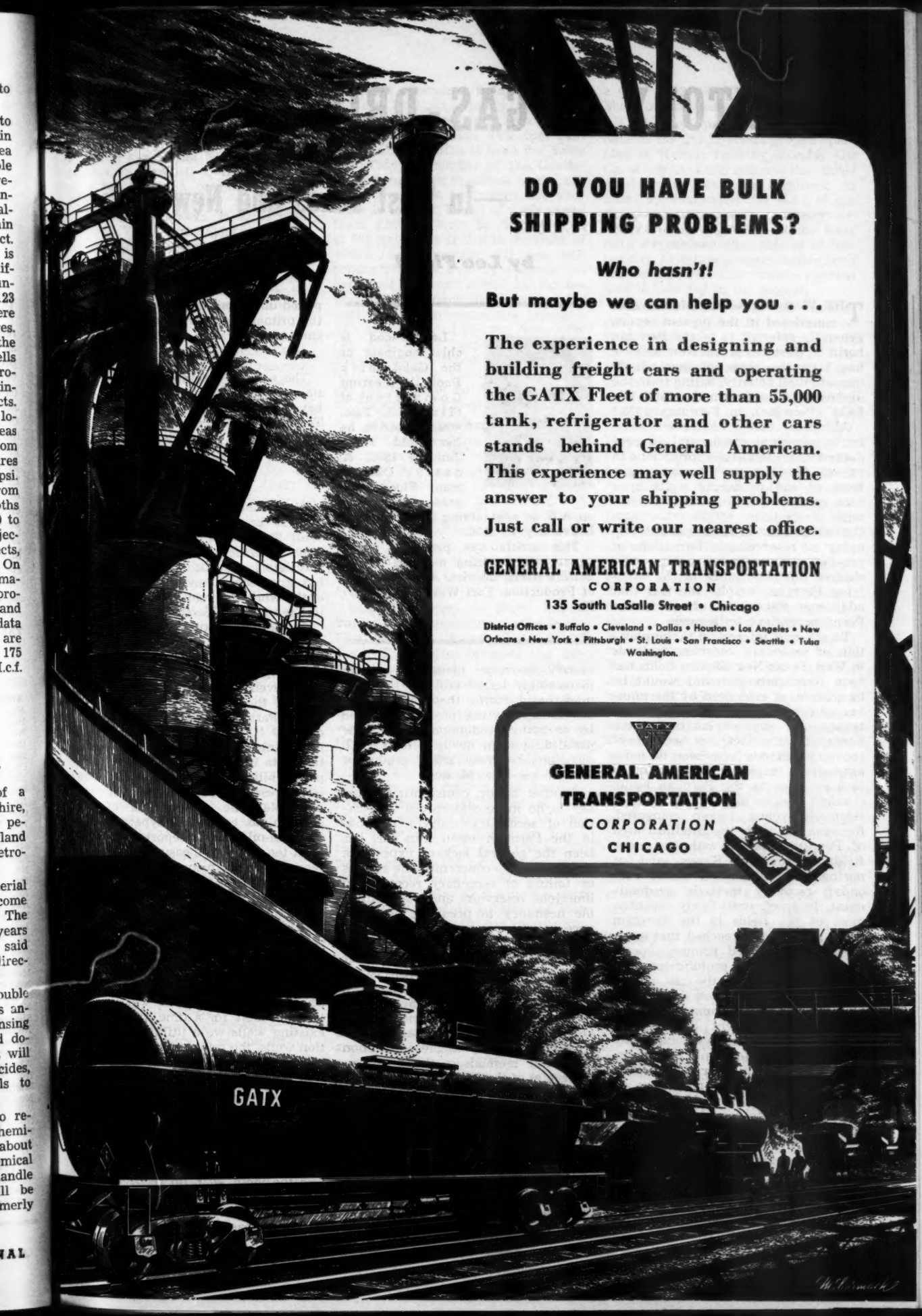
Shell to Expand English Petrochemical Production

Plans for the construction of a new petrochemical plant in Cheshire, England, and expansion of other petrochemical production in England has been announced by Shell Petroleum Co., Ltd.

Petroleum used as raw material for the new Cheshire plant will come entirely from sterling sources. The over-all program is the result of years of research and development, said George Legh-Jones, managing director.

One Shell refinery is to double current production of 24,000 tons annually of synthetic soaps, cleansing agents, and other industrial and domestic chemicals. Another plant will increase production of insecticides, fungicides, and other chemicals to 30,000 tons annually.

The expansion is expected to result in a reduction of British chemical imports from America by about $4,000,000 annually. Shell Chemical Manufacturing Co., Ltd., will handle manufacturing while sales will be under Shell Chemicals, Ltd., formerly Technical Products, Ltd.



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INVENTORY OF GAS-DRIVE PROJECTS

—In West Texas and New Mexico

by Lee Flood

THE West Texas-New Mexico area considered in the present report, generally referred to as the Permian basin of West Texas and New Mexico, has been the scene of increasingly important oil activity, dating from the discovery of the first major field, Big Lake (Permian), in February 1923.*

Although there has been some fairly important commercial oil production from sandstone formations in various fields in the Permian basin, most of the producing wells have been completed in limestone or dolomitic formations of Permian age. Current interest in finding and developing oil reservoirs in formations of pre-Permian age has served to overshadow the importance of the overlying Permian, despite the fact that additional discoveries of oil in the Permian continue to be made.

To say that interest in the application of secondary recovery methods in West Texas-New Mexico fields has been completely dormant would be inaccurate, as evidenced by the number of projects listed in the present review. If any explanation were needed for the fact that secondary-recovery methods have been no more extensively employed thus far in an area so large as the Permian basin, it might best be said that the area is relatively young (when compared, for example, with the Bradford area of Pennsylvania or with the older fields of southern Kansas and of northeastern Oklahoma, where secondary-recovery methods predominate). In brief, until fairly recently, most of the fields in the Permian basin had not yet reached that stage in which continued primary operation had become so prohibitively uneconomic as to force the use of secondary-recovery methods as the only alternative to abandonment of the wells. Despite recent advances in crude-oil price schedules, which may be expected to afford only temporary economic relief in older fields, there are many producing properties in West Texas and New Mexico that must be made to respond to secondary-recovery techniques or else face economic abandonment. Recognition of this impending need to apply secondary-recovery methods on an increasingly larger scale in the Permian basin during the coming years is evidenced by the interest expressed by so many production men in the proceeding of the newly formed A.P.I. secondary-recovery study group for West Texas-New Mexico.

Another factor, contributing possibly to no more widespread application of secondary-recovery methods in the Permian basin thus far, has been the general lack of experience and knowledge concerning the success or failure of secondary recovery in limestone reservoirs and the justifiable hesitancy to predicate performance in such reservoirs on the more widely available results in sandstone reservoirs. Fortunately, the number of secondary-recovery projects in limestone reservoirs being undertaken in other areas is increasing, and as reports of the results become available for study, interest should be stimulated thereby in the application of similar methods in the limestone reservoirs of the Permian basin.

It is important also to note the increasing interest among engineers in the West Texas-New Mexico area in the possibility of returning gas to the reservoir (and, in some instances, the establishment of artificial water drives) as an adjunct to primary recovery to be employed in the earlier life of the properties rather than as measures to be postponed until, and employed only, after the primary recovery phase has been concluded.

*Westbrook field, Mitchell County, discovered in January 1920, may be considered to be the first field discovered in West Texas, though lacking the importance of Big Lake.

Lee Flood is chief engineer of the Goldsmith Pool Engineering Committee at Midland, Tex., which position he has held since January 1946. A native Oklahoman, Flood was graduated with an A.B. in engineering from Stanford University, in 1930.

This article was presented as a paper at the spring meeting of the Southwestern district, A.P.I. Division of Production, Fort Worth, March 27-28.

Summary

The present inventory of gas-injection projects includes 15 projects that have been undertaken in the West Texas-New Mexico area. In addition, brief mention is made of proposed projects in nine other fields in the area.

West Texas

Ward County, Shipley pool.—The earliest known gas-drive project in West Texas was instituted in April 1930, by Atlantic Refining Co. on its Hayzlett lease. Although the project has since been abandoned, the results of the work were considered generally to have been successful.

Shipley pool, discovered in 1928, comprises 2,700 acres, on which a maximum number of 147 wells were drilled, producing oil from the Queen and Seven Rivers formations, members of the Guadalupe group in the upper Permian, at an average depth of 2,480 ft. Average thickness of the producing formations is 20 ft. Formation data in this early field (porosity, permeability, connate-water content, initial reservoir pressure, etc.) are not available. The reservoir is of the solution-gas expansion type; the initial gas-oil ratio is reported to have been too small to measure. Estimated recoverable oil (primary) is 7,600 bbl. per acre. Total oil recovered (to January 1, 1947) is estimated to be approximately 76 million barrels.

Prior to gas injection on the 70-acre Hayzlett lease, the daily oil production from the lease was 200 bbl., water was negligible, and the volume of gas small, although not measured. The "pattern" employed was irregular; one (and, for a time, two) of the existing wells were utilized as injection wells, the remaining six (and, for a time, five) wells serving as production wells, some of which flowed, some of which required pumping. During the period of gas injection, the rate of returning gas is estimated to have totaled from 100 to 200 M.c.f. per day. The extent of bypassing in the reservoir was not determined, nor was the increase in oil recovery as a result of gas injection estimated reliably. Present daily oil production from the lease is 30 bbl., with only

a trace of water and a negligible volume of gas.

North Ward-Estes pools.—Beginning in June 1940, Gulf Oil Corp. began injecting gas in the North Ward Repressuring Project, comprising 3,901 acres in the area comprising North Ward pool (which now includes the area formerly known as Estes pool).

North Ward (and Estes) pool, discovered in 1929, comprises a total of approximately 13,360 acres, on which a maximum of 334 wells have been drilled to the Yates (sand) formation (locally termed the O'Brien), a member of the Guadalupe group in the upper Permian, at an average depth of 2,700 ft. Average thickness of the pay zone is 40 ft., and the reservoir is considered to be of the gas-cap-drive type. Initial reservoir pressure and temperature are estimated to have been 1,400 psi. and 84° F., respectively. The initial gas-oil ratio was approximately 1,200 cu. ft. per barrel. Total oil production for the entire field (to January 1, 1947) is estimated to be approximately 60 million barrels.

The 3,901-acre repressuring project comprises a total of 15 injection wells, on an irregular pattern, and 113 producing wells. The rate of returning gas to the reservoir has been approximately 2,165 M.c.f. per day at an injection pressure of 373 psi. Of the producing wells, 50 are flowing, 44 are on gas-lift, and 19 are pumping. Prior to gas injection, the wells produced at a daily rate of 2,026 bbl. of oil, 9,383 M.c.f. of gas, and 55 bbl. of water. Currently, the wells produce at a daily rate of 2,365 bbl. of oil, 7,447 M.c.f. of gas, and 109 bbl. of water. The extent of gas bypassing has not been determined. As of July 1, 1946, the wells involved in this project had produced a total of 15,110,152 bbl. of oil, an estimated 52,311,444 M.c.f. of gas, and 257,524 bbl. of water.

Payton field.—Relatively little information has been gathered thus far on the other two known gas-injection projects in Ward County—both operated by Luse and Ice on their A. Blair and J. O. Brictson leases.

On the Blair lease, the record indicates that approximately 150 M.c.f. of gas is being returned daily in two injection wells, and approximately 185 bbl. of oil per day is being produced from 11 producing wells.

On the Brictson lease, the one injection well is receiving approximately 85 M.c.f. of gas per day, and five producing wells are yielding approximately 33 bbl. of oil per day.

Winkler County, Kermit field.—A greater number of secondary-recovery projects have been undertaken in Kermit field than in any other field in the West Texas-New Mexico area, including several water-flood projects not included in the scope of the present paper.

Kermit (Permian) field, discovered in July 1928 is variously considered to comprise a productive area of from 12,000 to 15,000 acres. Principal Permian oil production is from the Yates sandstone, a member of the Guadalupe group, with thickness of the oil-bearing section estimated to vary from 20 to 40 ft. Depth of wells varies from 2,800 to 3,100 ft. A maximum of 900 wells was drilled in the field, of which approximately 677 are still productive. The field as a whole has produced approximately 35 million barrels of oil since its discovery. Initial reservoir pressure and temperature are estimated to have been 1,450 psi. and 83° F., respectively. Initial gas-oil ratio is reported variously to have been from 470 to 880 cu. ft. of gas per barrel of oil. The reservoir is of the solution gas-drive type.

1. **Magnolia project.**—Perhaps the largest (and the oldest) gas-repressuring project in the Kermit field is operated by Magnolia Petroleum Co. on its Walton lease. The project comprises 1,120 acres, and includes 9 injection wells, and 82 producing wells. The injection rate currently is 2,702 M.c.f. of gas per day at a pressure of from 400 to 600 psi. Extent of gas bypassing is considered to be moderately high.

2. **Gulf project.** — Next largest known gas-repressuring project in the Kermit field is operated by Gulf Oil Corp. The project involves the 240-acre L. Daugherty lease, on which the 24 wells are drilled in a five-spot pattern; 6 wells are utilized as injection wells, and 18 serve as producing wells. Gas injection was begun in December 1944. Prior to gas injection, daily lease production was 113 bbl. of oil, 697 M.c.f. of gas, and no water. Currently, the daily production rate from the lease is 168 bbl. of oil, 1,205 M.c.f. of gas, and no water. All producing wells are on the pump. Injection pressures vary from 70 to 200 psi., averaging 150 psi. The injection rate is approximately 528 M.c.f. of gas per day. Total oil production from the lease (as of July 1, 1946) has been 1,041,206 bbl., with gas production estimated to be 4,421,216 M.c.f.

3. **Sun project.**—Beginning in December 1941, Sun Oil Co. has operated a gas-injection project on its L. Daugherty lease, comprising 160 acres. On an irregular pattern, two wells are utilized as injection wells, with six wells serving as production wells, equipped for gas lifting. Approximately 200 M.c.f. of gas is being returned daily at an injection pressure of 456 psi. Prior to gas injection, the daily production from the lease was 193 bbl. of oil, 1,181 M.c.f. of gas, no water. Currently, the lease is producing 31 bbl. of oil daily accompanied by 376 M.c.f. of gas, no water. Gas channeling (bypassing) is believed to be severely high. The lease has produced (as of January 1, 1947) a total of 320,459 bbl. of oil, 1,309,019 M.c.f. of gas, and no water.

4. **Monday project.** — Incomplete data on the gas-injection project operated in Kermit field by Monday Oil Co. of San Antonio indicate that three gas-injection wells are utilized, in which approximately 223 M.c.f. of gas per day is returned to the reservoir. The 12 producing wells on the lease have a combined allowable of 60 bbl. per day. Injection pressure varies from 225 to 350 psi. One water-injection well is included in the project.

Hendrick field.—The one known gas-injection project in the Hendrick field is operated by Stanolind Oil & Gas Co. The field, discovered in July 1926, is variously estimated to comprise from 10,000 to 12,000 proved acres. From a maximum of 650 wells, the number of producing wells has declined to slightly more than 200. The wells have an average depth of 3,100 ft., and produce from the Whitehorse lime of Permian age. As of January 1, 1947, total oil production from the field as a whole was approximately 210 million barrels. Initial reservoir pressure is estimated to have been 1,350 psi.

Known as the Hendrick Experimental Gas-Injection Project, Stanolind's operation is limited, at present, to one injection well; consequently, the area affected by the returned gas is limited to the area immediately surrounding the injection well. Nevertheless, there are 228 producing wells around the injection well, the number of which may be affected remaining problematical. This project was begun last June 13. Currently, 250 M.c.f. of gas per day is being injected at a pressure of 1,120 psi.

Gaines County.—The one known gas-injection project in Gaines County is in Cedar Lake field, and is operated by Stanolind Oil & Gas Co. The field, discovered in September 1939, comprises 3,000 acres and includes 60 wells producing from the San Andres dolomitic limestone at an average depth of 4,800 ft. All wells are on artificial lift. The reservoir is of the solution-gas-drive type. As of January 1, 1947, the field as a whole has produced approximately 3,275,000 bbl. of oil.

Known as the Cedar Lake Pressure-Maintenance Project, Stanolind's gas-injection operation embraces 3,000 acres, including 8 injection wells and 51 producing wells. The project was begun on April 6, 1946. Gas is being injected at a daily rate of 500 M.c.f. per day at a pressure of from 700 to 1,100 psi. All producing wells are on the pump, and are producing a total (daily) of 1,630 bbl. of oil and 30 bbl. of water.

Ector County, South Cowden-Foster fields.—The experimental gas-injection project in the South Cowden-Foster area, operated by Stanolind Oil & Gas Co., was active from Octo-

ber 1942 to August 1944, a period of 22 months.

Inasmuch as a report on the project was included in a recent paper by Elkins*, any details reported here would be merely repetitious.

New Mexico

Langlie field.—Details of the Langlie project were reported in the excellent paper by Ralph Gray.†

Maljamar project.—The gas-injection project known as the Maljamar Comparative Repressuring Agreement in Maljamar pool, Lea County, was begun in April 1942. The project, embracing 6,600 acres, includes 165 producing wells and 13 injection wells in a one to nine pattern. Gas is injected at a rate of 200 M.c.f. per day at a pressure of 1,400 psi. All producing wells are flowing. The extent of gas bypassing is considered to be minor.

Maljamar field, discovered in August 1926, comprises 10,000 productive acres. A maximum of 239 wells have been drilled to the Grayburg and San Andres formations of Permian age. The reservoir is of the solution-gas-drive type. As of January 1, 1947, the field had produced 13,875,000 bbl. of oil, 14,038 M.c.f. of gas, and 150,000 bbl. of water. Estimated recoverable oil is 40,000,0000 bbl., or 4,000 bbl. per acre. Initial reservoir pressure and temperature are estimated to have been 1,350 psi. and 80° F., respectively. Initial gas-oil ratio is estimated to have averaged 800 cu. ft. per barrel of oil.

Loco Hills project.—Available data on this cooperative gas-injection project in Eddy County, begun in October 1941, indicate that approximately 19 input wells and 174 producing wells are involved in the 6,000-acre project, producing from the Grayburg (of Permian age) at a depth of 2,600 ft. All three producing zones are sandstone. Neither a gas cap nor a water drive is present, and the oil is undersaturated. Approximately 40 per cent of the gas produced is returned underground at an injection pressure of 600 to 800 psi.

Grayburg project.—A cooperative gas-injection project in the Grayburg unit area, northeastern Eddy County, was begun late in 1945, slightly more than a year ago.

The project comprises approximately 4,800 acres, of which only 1,920 acres are proved by the drilling of 46 wells on an irregular spacing pattern. Initial plans for repressuring the area called for the return of approximately 1,000,000 cu. ft. of gas per day at an injection pressure of not to exceed 700 psi. Prior to injection, gas-oil ratios varied from 500 to 4,300 cu. ft. per barrel of oil. It was planned to maintain the average gas-oil ratio in the unitized area below 2,000 to 1 by repairing or closing in wells excessive ratios.

Proposed Gas-Injection Projects

Gas-injection projects, proposed or in initial stages, in West Texas-New Mexico area are enumerated briefly as follows:

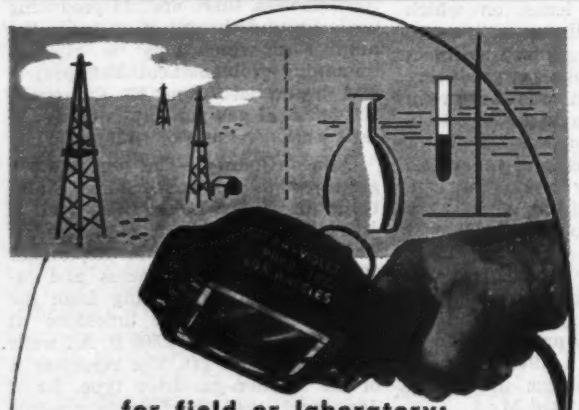
McElroy field.—Gulf Oil Corp. has completed a compressor plant in McElroy field for the dual purpose of providing gas for gas lift and for gas injection. It is planned to employ two injection wells initially, with each well receiving approximately 500 M.c.f. per day.

Goldsmith field.—Stanolind Oil & Gas Co. has requested a hearing before the Railroad Commission on April 8 to consider an application for a temporary permit to return gas to the reservoir in an experimental project embracing six Stanolind leases in the north part of the field.

Others.—Gas-injection, on some basis, has been or is being considered in the following West Texas-New Mexico fields: Fullerton, Vacuum, Keystone, Lovington, Slaughter, Seminole, and Harper.

*"The Importance of Gas as a Driving Medium in Limestone Reservoirs as Indicated by Recent Gas Injection Experiments, and Reservoir Performance History" by L. E. Elkins. Presented at A.P.I. Mid-Continent district meeting June 7, 1946.

†"A Review of 5 Years of Operation at the Langlie Unitized Repressuring Project" by Ralph L. Gray. Presented at annual A.P.I. meeting, Chicago, November 1946.



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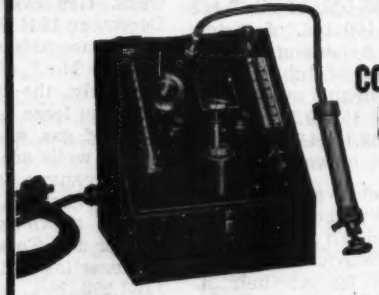

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Combating Fires That Have Passed Beyond Incipient Stage

by Henry W. Boggess*

IN the study and analysis of hand-type fire extinguishers, consideration should be given to the wisdom of preparing to combat fires that have advanced beyond the incipient stage. Hand-type extinguishers are not designed to fight fires that have spread beyond the beginning stage. Protection from advanced fires may be had by installation of

1. Wheel-cart extinguishers.
2. Water-pressure lines, including foam generators.
3. Fog nozzles.
4. "Wet" water.

Foam and dry powder are available in wheel carts and contain sufficient quantities to extinguish considerable fire. Both can be recharged on the job which insures constant protection. Foam will, of course, need to be protected from freezing.

SAFE Field PRACTICES

Foam generators for use on water and hose lines should be given consideration, especially where there is possibility of products spillage. Generators are also important in handling tank fires. In plants where pumps and higher-pressure water lines with hydrants are regular installations, foam generators for fire-fighting purposes should be standby units, along with a supply of foam generator powder in pails. This foam is valuable in confining and extinguishing large fires of lubricating oils, kerosene, diesel fuels, furnace oils, greases, gasoline, naphtha, and other petroleum products. The ordinary generator pail holds 40 lb. of foam powder and is moisture proof. Some operators equip special fire trucks with auxiliary pumps, generators, and powder.

Where pumps, high-pressure water lines, and hydrants are regular installations, the fog nozzle will be found to be a valuable aid in fighting major fires. The fine mist-like spray is invaluable as a shield for fire fighters to approach near the seat of the fire and the atomized spray is highly efficient as a smothering agent. It should be understood that fog nozzles are more or less inefficient where the water pressure is under 125 lb. Ideal fog is generated with an average pressure of about 185 lb. Fog nozzles in scattered production units are usable in wild wells and other major field fires by using mobile cementing trucks having high pump capacity by simply connecting such truck pumps to a lease water tank.

The new "wet" water method of fire fighting is not considered of great value in the oil industry because water saturation is not the solution in combating fires in volatile liquids.

*Superintendent, Employment-Insurance-Safety, Sinclair Prairie Oil Co.

Big Smoothies

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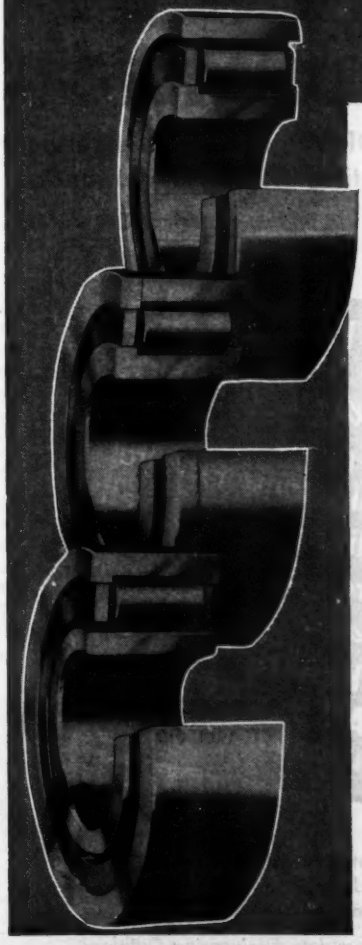

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AMERICAN Heavy-Duty ROLLER BEARINGS

New Shooting Method

(Continued from page 86)

The new technique, which, may possibly revolutionize oil-well shooting practice, is applicable at present to the following selective shooting problems:

The "star shot" (Fig. 1-B) is designed to obtain maximum results from small amounts of explosive used in "clean out" operations.

The "pancake shot" (Fig. 1-D) is very effective in concentrating as much of the force of the explosion as possible in thin strata. The "pancakes" are placed in series, with spacing dependent upon information from core analysis. The pancake shot will also make a clean "cut off" in shooting pipe.

The "follow up" is a shaped shot of slow explosive placed at the very bottom. It is effective in cleaning the hole immediately after the main explosion.

For five-spot secondary-recovery operations the force of the explosion may be "quartered." That is, the pressure-intake wells may be shot hard toward the opposite intake well and less toward the producer, thus evening up the pressure pattern. (Fig. 2).

Figs. 3, 4, and 5 are photographs of the effects of various kinds of charges as demonstrated on a surface outcrop.

Shells are made at the present time by Petroleum Explosives Co. of Oil City and Bradford, Pa., under Murphy's direction. New equipment is being arranged to reduce the cost of making the shells by hand and for use of materials other than tin to give the desired shape. These features and certain othe novel ideas, are covered by application for patents. They are made available to the industry and used by the torpedo companies under the provisions of the laws governing "Patent Applied For."

Fig. 3 — Detonation of stick of dynamite against face of rock caused little surface marking and no cracking

Fig. 4—Shaped charge, made from one dynamite stick, caused surface breaking and both horizontal and vertical cracking

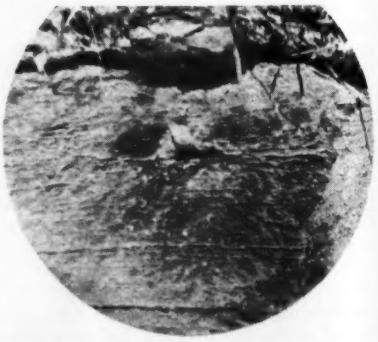

Fig. 5—Shaped charge detonated 15 in. from bottom caused surface damage, cracking, and rock blown off bottom

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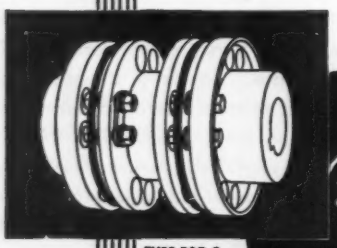

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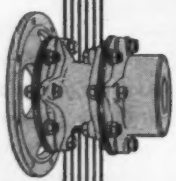

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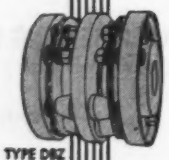

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MODERN Rotary DRILLING

Draw Works—General

MAXIMUM horsepower rating of a given draw works gives the operator a clear picture of the capacity of the equipment. Since the rating involves the factors of both the load and the speed, it makes possible analysis of performance within different available drawworks speeds. Torque capacity rating is also used.

Manufacturers' recommended depth rating is based on hoisting speeds considered as efficient and on a number of interrelated factors affecting the basic design. Use of draw works beyond its depth-capacity rating at the expense of slowing down of operation, is generally a poor practice from the standpoint of both engineering and economics. This is particularly true if the equipment is to be used under drilling conditions requiring frequent round trips.

Trends of Improvements

So much progress has been made during the last few years in the design of power-rig draw works that, for sake of clarity of discussion, this progress must be considered a separate subject. First, however, changes and improvements should be discussed which are common to both the steam-rig and the power-rig draw works.

Designers of modern draw works are striving to attain the maximum in mechanical efficiency, sturdiness of construction, portability, and safety. Some features which have been incorporated into different types of draw works to attain these purposes, are summarized below.

Shafts, made of heat-treated alloy steels, are supported on self-aligning roller bearings. Sprockets have precision, machine-cut teeth and specially hardened surfaces. Multistrand chains are used. Frames assure maintenance of the proper alignment of the drives. Positive lubrication and ease of access to the greasing points are provided for. Moving parts are protected by metal guards as a safety measure and as protection of the parts from dust, dirt, and sand. Inspection doors make possible inspection, lubrication, and maintenance. The draw works is unitized, within a heavy frame, and it is skid mounted.

Radical changes have been made in the clutch system of the draw works. This subject will be treated in more detail in later discussion of power-rig draw works. Here, trend should be noted toward use of friction clutches and toward pneumatic or vacuum operation of the clutches. Manual emergency controls are provided for handling of clutches in case of failure of the high-pressure air or vacuum supply.

Catheads

From the point of view of the frequency and severity of accidents, the cathead in the past was one of the most dangerous points of a rotary rig. Depending on friction for its operation, the ordinary cathead becomes a positive drive when either end of the line fouls by overlapping of the coils. The result is instantaneous increase of the rate of winding from several to several hundred feet per minute. Unless the operator is experienced and prepared for such an emergency, he becomes fastened to the rotating cathead with resulting serious or fatal accident.

Modern spinning and breakout catheads reduce this hazard considerably, by using the line which is not handled on the spool by the operator, by providing clutch control of the movement of the line and by giving the operator control of the power applied to the jerk line. Handled from the driller's position, modern catheads are an important factor in improving the efficiency of drilling operations, by reducing time needed for making up and breaking out of the pipe.

Advantage of large drum-spool diameter, from the point of view of improving the service of the wire line, long has been recognized. Present trend is also toward increasing the width of the drum's spool to reduce the number of wireline wraps on the drum. A large number of wraps not only increases the chances of wire-rope damage, but has also other unfavorable effects such as increased line speed, decreased line pull, and decreased braking effect. There is, of course, a practical limit to the satisfactory width of the drum spool, since this dimension controls the fleet angle of the line. Should a wide-spool draw works be used with a low derrick, the angle of the line at the crown-block sheave may become sufficiently large to affect unfavorably the life of the line.

Controls

Present trend toward more automatic operation of rotary rigs is a necessary result of the growing size, weight, and complexity of a modern rig. This trend is bringing about a growing multiplicity of controls which the driller has to operate, and of indicating instruments, which he has to watch.

The controls and the instruments are centralized at the driller's position at the draw works. Special attention is given to the proper arrangement of controls to reduce motions needed for their operation.

Full-wrap type of brakes, providing close to 360° arc of contact on the brake flanges, is one of the improvements of the draw-works friction brakes. Other improvements include better control of the hardness of alloy steel brake flanges, improved brake-lining material, and more sensitive and positive brake mechanism. Manual effort required to exert any given braking effect has been reduced by properly designed brake-leverage system. Brake levers are provided with locking devices, which make it possible to hold the lever in any given position. This increases the sensitivity of the feed-off rate and eliminates the need for tying-down or weighting of the lever. Water cooling of the brake flanges is a standard.

One of the large operators is experimenting now with an air-operated draw-works brake. The arrangement includes hydraulically controlled feedoff, operating within certain range of the drilling progress rate.[1]

Auxiliary brakes, of the retarding type, continue to be the most important improvement from the point of view of saving of the friction brake. They include the well-known hydraulic brake and, a recent development, a brake based on electromagnetic principle.

Reference

1. E. H. Short, Jr.: "Air-Operated Brakes Successfully Used in Gulf Coast Drilling," The Oil and Gas Journal, February 15, 1947, p. 78.

No. 15 in a series by Joseph Zaba, petroleum engineer, Houston

QUESTIONS on TECHNOLOGY

by W. L. Nelson

Consulting Engineer

Progress in Petrochemical Manufacture

During the war there was considerable publicity given to the idea that in the future the chemical industry would use petroleum as a source of many of its products in place of coal tar. As far as we can observe, very little has come of this. Can you survey the situation for us?—H. R. H.

Although it might be possible for oil companies or their subsidiaries to enter certain fields of chemical manufacture by pushing aside already established manufacturers, such an approach can seldom be successful and hence, the entrance of petroleum refiners into the chemical industry must await, to a large extent, the development of new chemicals or entirely new uses for old chemicals. This is mentioned to indicate that the entry of petroleum refiners into chemical manufacture will be an orderly one. It will be an effort that will at first develop slowly but may pyramid upon itself to produce enormous results when once it gains momentum.

Still Gaining Momentum

There is some indication that momentum is being gained because the number of oil companies that list themselves as chemical manufacturers has increased many fold since 1935. According to Synthetic Organic Chemicals, U. S. Production and Sales, which is published at frequent intervals by the U. S. Tariff Commission, the number of companies that manufacture chemicals from petroleum and natural-gas hydrocarbons are approximately as follows:

	No. of companies
1935-1936	1
1937	2
1939	4
1940	5
1941-1943	24
1944	48

This listing is undoubtedly not complete because many operations are conducted under other names.

The tonnage has also increased but the situation is not entirely clear because the Government records did not show petroleum-chemical manufacture as a separate item until 1943. Even after 1943, the groupings of chemicals in the Tariff Commission records have been altered each year. Nevertheless, the pounds of chemical manufacture from petroleum as shown in detail in Tables 1, 2, and 3 has been somewhat as follows:

1942	500,000,000
1943	2,434,914,665
1944	3,462,625,000
1945	4,330,400,000

Finally, some of the chemicals listed by oil companies and others that manufacture chemicals from natural gas or petroleum are shown in Table 4. The listing shown in Table 4 was taken mainly from report No. 155, Synthetic Organic Chemicals, 1944, of the U. S. Tariff Commission, and a few chemicals announced during 1946.

There are some indications that refiners are confused by the array of chemical products that can be made from their raw products—confused to such an extent that they hardly know which way to turn. Meanwhile, they are marketing raw or crude products and investigating the conversion of these raw stocks into more valuable finished products.

TABLE 1—1943 PRODUCTION OF CHEMICALS RAW MATERIALS FROM PETROLEUM

	Pounds
Cresylic acid	13,915,900
Naphthenic acids	17,341,192
Butadiene	103,091,279
Ethylene	166,224,385
Propane, etc.	394,620,200
Butane, etc.	668,496,079
Miscellaneous	201,225,630
Total	1,564,914,665
Toluene*	870,000,000
Grand total	2,434,914,665

*Approximate and not including that from ordnance-controlled plants.

TABLE 2—1944 PRODUCTION OF CHEMICALS FROM PETROLEUM AND NATURAL GAS

	Pounds
Cresylic acid	.....
Naphthenic acids	28,462,000
Xylene	354,639,000
Butadiene	488,945,000
Ethylene	272,188,000
Propane, etc.	214,559,000
Butane, etc.	202,380,000
Miscellaneous	569,090,000
Others	674,362,000
Total	2,804,625,000
Toluene*	414,000,000
Toluene, aviation grade	244,000,000
Grand total	3,462,625,000

*Does not include production of ordnance plants.

TABLE 3—1945 PRELIMINARY PRODUCTION OF CHEMICALS FROM PETROLEUM AND NATURAL GAS

Chemicals	3,300,000,000
Toluene	628,000,000
Toluene, ordnance*	326,000,000
Toluene, aviation	76,400,000
Total	4,330,400,000

*Estimated 40-50 million gallons.

TABLE 4—SYNTHETIC CHEMICALS, PETROLEUM (1944)

Aromatics (other than benzene, toluene or xylenes)

Acetic acid
Acetaldehyde
Amyl chloride
Amyl amine
Amyl acetate
Amyl alcohol
Acetone
Alkyl nitrites
Alkyl chloride
Alkyl alcohol
Amyl ether
Amylenes
Amyl mercaptan
Diamyl sulfide
Alcohol, isopropyl
Alcohol, diacetone
Alcohol, sec-butyl
Alcohol, ter-butyl
Acetic anhydride
n-Butane
i-Butane
Butenes
i-Butene
Butadiene
Butene-1
Butene-2
Benzene
Butyl-chloride
Butyl amine
sec-Butyl acetate
2-Methyl butadiene-1-3*
2,2-Dimethyl butane*
2,3-Dimethyl butane*
sec-Butyl benzene*
Cresylic acid
Chlorohydrin, trimethylene
Calcium salt of bister-amylphenol sulfide
Chloroform
Cyclopentane
Chloroparaffins
Cyclopropane
Diisobutylene
Dioctanyl disulfide
Ethane
Ethylene
Ethylamine
Ether, ethyl
Ether, isopropyl
Epichlorohydrin
Ethene-propene mix
Ethyl benzene*
Ethyl acetate
Ethylene dichloride
Ethylene glycol
Glycol, triethylene
Glycerol chlorohydrin
i-Hexene
Isohexanes*
n-Hexane*
Isoheptanes*
n-Heptane
2,2,5-Trimethyl hexane*
Isoheptanes*
Isoprene
Isooctylphenol sulfide, barium
Isooctylphenol stearol, barium
Methane
Methanol
Methyl-acetone-acetal
Methylethyl ketone
Methylisobutyl ketone (and with some carbinol)
Methylpropyl ketone
Methyl chloride
Methylene chloride
Mercaptan, ethyl
Mercaptan, alkyl
Maleic acid and anhydride
Naphthenic acids
Naphthenate, chromium
Naphthenate, cobalt
Naphthenate, iron
Naphthenate, lead
Naphthenate, manganese
Naphthenate, mercury
Naphthenic acid, sulfonated, sodium salt
Naphthenic acid, sulfonated, aluminum salt
Isooctanes*
Isooctenes*
Petroleum sulfonate, ammonia salt
Petroleum sulfonate, barium salt
Petroleum sulfonate, calcium salt
Petroleum sulfonate, sodium salt
Petroleum alkylsulfonate, sodium salt
Polyalkylbenzene-sulfonic acid
Propane
Propylene
Polymer resin
Dichloropentane
Perchlorethylene
2-Propanol, 1-3-dichloro
Polybutene
Paraffin, chlorinated
Isopropyl acetate
i-Pentane
n-Pentane
2-Methyl pentane*
3-Methyl pentane*
2,3-Dimethyl pentane*
2,4-Dimethyl pentane*
2,2,4-Trimethyl pentane*
Pentene-1*
Pentene-2*
Rubber, GR-S (styrene)
Rubber, thiokol (sulfide)
Rubber, GR-A (acrylonitrile)
Rubber, GR-I (polyisobutylene diolefin)
Rubber, GR-M (neoprene)
Rubber, butyl
Sulfurized chlorokerosene
Styrene
Toluene
Toluene (aviation grade)
Thiokol rubber
Triamyl borate
Triisobutylene
Xylenes

*1946 information.

ENGINEERING *fundamentals*

Treating Artificial-Lift Wells With Mud Acid

PUMPING wells often can be economically worked over by the use of mud acid without the necessity of pulling liners, underreaming, etc. If the well is producing water, the quantity of water may be increased, along with the oil, but the percentage of water likely will not increase because the entire sand is cleaned. Many pumping wells can handle an increase in fluids and the increase of oil will more than offset any additional costs of handling small amounts of water.

If the well is a pumping well and there is no danger of a blowout, the rods and standing valve should be removed a day previous to putting in acid. This is to permit the well to reach its static fluid level, which should be measured at the time. The acid is pumped into the tubing, followed by sufficient oil to displace the fluids at the bottom of the hole with the acid. The tubing then can be removed and installation made for swabbing and sand-pumping operations.

The swab run on the end of the sand line does not need to have the same o.d. as the i.d. of the liner or the casing but it needs to be large enough so that in working the swab up and down opposite the perforations, the swab will create a surging motion at this point. This is for the purpose of forcing the acid to work in and out of the perforations or liner slots, thereby drawing into the well any muds or sands which may have collected outside of the casing or liner. In handling the acid in this manner it will not be forced to any great extent back into the formation yet the liner will be cleaned of any deposits of mud, fine sand, or calcium carbonate which have collected against the screen.

After working the swab up and down for some time near the perforations, a sand pump should be run to collect whatever material has been brought into the well. The process should be continued until nothing is brought into the well for the sand pump to pick up and all of the acid has been removed. After the well has been satisfactorily cleaned, pumping equipment can be installed, being careful no chromium-plated or chrome-alloy steel is in the assembly, as mud acid will immediately destroy any metal which has chrome in it. The well can be pumped for several days, and if it "goes off" the pump immediately should be replaced so as to continue producing the well to remove all of the acids as soon as possible. In event there is a small amount of sand coming in and the well is a light producer, a small stream of salt water or oil can be injected into the casing. This will tend to carry the sand to the top and the well will not pump down and allow the sand to settle around the bottom-hole equipment.

One caution that should be emphasized is to remove from the hole all of the acids and the material which the acids have dissolved. Some acidizing jobs have been failures and the well's status worsened by neglect on this score.

If the well being treated is not sand pumped sufficiently, a very heavy emulsion may be left in the hole which the pump cannot handle. If the emulsion is left in the hole too long it may cause a bridging in the perforations or liner slots and will have to be removed by additional acid treatments.

Acidizing Gas-Lift Wells

Acidizing of gas-lift wells is similar to that for pumping wells. The tubing has to be removed, the standing valve taken off, and the tubing run back to bottom. The operator needs to swab and sand pump. The swabbing action is the most important item in this case. A gas-lift well generally has sufficient fluid to remove the acids by washing from the bottom with the fluids that enter the well. Any emulsions present also are removed readily by this action.

Acidizing by Bradenhead Squeeze

A typical bradenhead squeeze can be used on wells of many types without removal of any surface or subsurface equipment. The most important item besides carefully placing the acid at the face of the sand is to be sure to remove the acid as soon as possible.

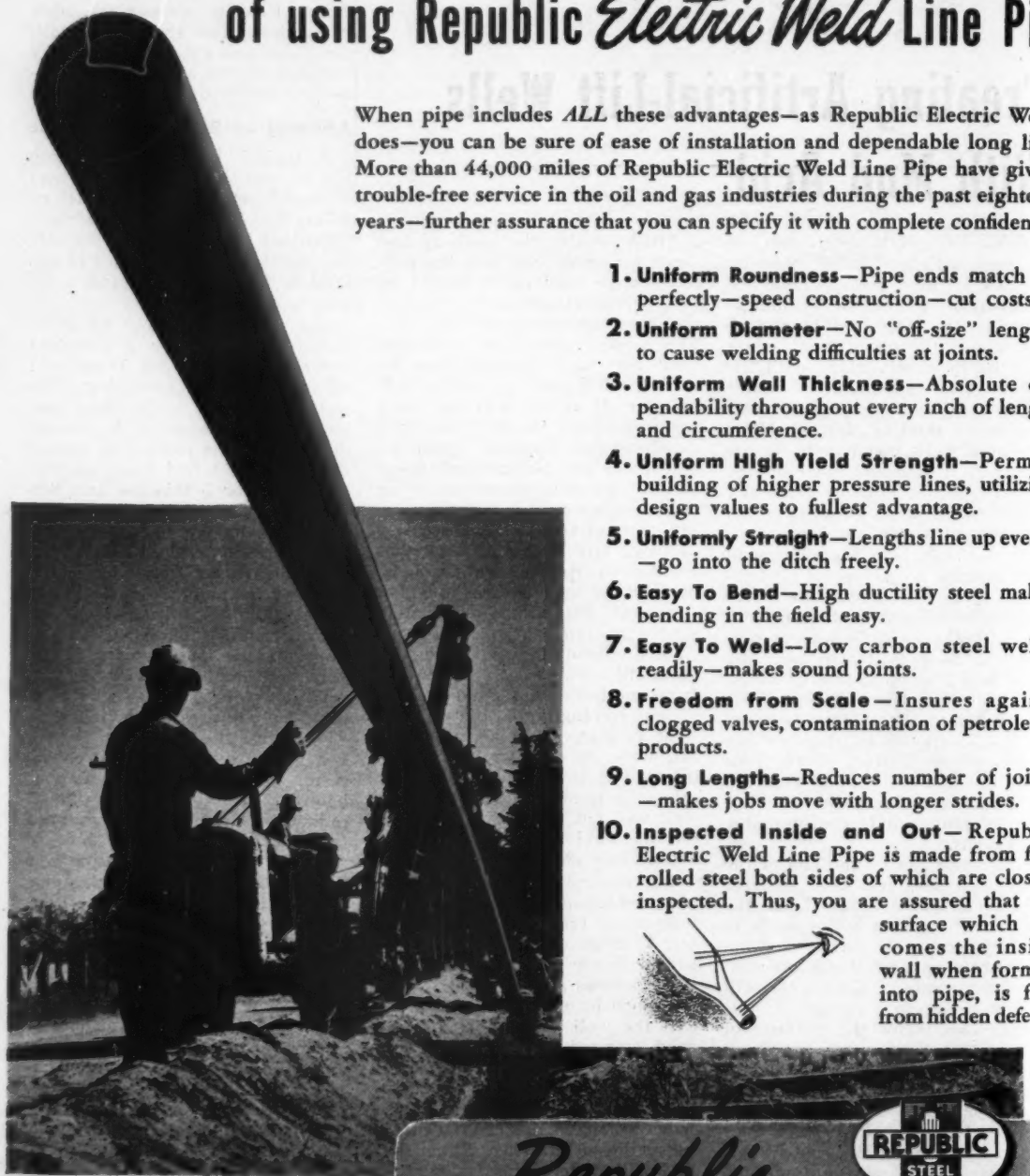
The method can best be illustrated by the history of a certain Wilcox well in a South Texas pool which had quit producing. The well was loaded with water and the acid placed opposite the formation. The casing valve was opened after the acid had been on the formation for 5 minutes and this was repeated twice. A surface pump pressure of 1,000 psi. was applied against the tubing string with the casing valve closed. It took approximately ¾ bbl. of fluid to raise the pressure to 1,000 psi. This pressure was left on the well for 5 minutes and then the casing valve was reopened, bleeding the well down to 0 psi. The second time, a pump pressure of 1,000 psi. was against the formation. It took 1½ bbl. to raise this pressure. The casing was bled off the same as before. The third time, a pump pressure of 1,500 psi. was used taking a volume of 2½ bbl. to raise the pressure. The casing was bled off again. The fourth time, 1,600 psi. surface pressure was reached, taking 3½ bbl. to raise the pressure. The formation broke down and pumping was stopped immediately. The casing again was bled down to no pressure. Three and one-half barrels of acid were pumped back into the formation and the top pressure was approximately 1,200 psi. The well was brought in and is making approximately 94 bbl. on ⅛-in. choke, with no water.

These pressures of course do not apply to all wells as some wells will break down at a great deal less pressure, but the case is illustrative of the pressuring methods which can be used.

Series prepared by Edward N. Jones, consulting engineer, Pettus, Tex.

10 ADVANTAGES

of using Republic *Electric Weld* Line Pipe



When pipe includes *ALL* these advantages—as Republic Electric Weld does—you can be sure of ease of installation and dependable long life. More than 44,000 miles of Republic Electric Weld Line Pipe have given trouble-free service in the oil and gas industries during the past eighteen years—further assurance that you can specify it with complete confidence.

1. **Uniform Roundness**—Pipe ends match up perfectly—speed construction—cut costs.
2. **Uniform Diameter**—No "off-size" lengths to cause welding difficulties at joints.
3. **Uniform Wall Thickness**—Absolute dependability throughout every inch of length and circumference.
4. **Uniform High Yield Strength**—Permits building of higher pressure lines, utilizing design values to fullest advantage.
5. **Uniformly Straight**—Lengths line up evenly—go into the ditch freely.
6. **Easy To Bend**—High ductility steel makes bending in the field easy.
7. **Easy To Weld**—Low carbon steel welds readily—makes sound joints.
8. **Freedom from Scale**—Insures against clogged valves, contamination of petroleum products.
9. **Long Lengths**—Reduces number of joints—makes jobs move with longer strides.
10. **Inspected Inside and Out**—Republic Electric Weld Line Pipe is made from flat-rolled steel both sides of which are closely inspected. Thus, you are assured that the surface which becomes the inside wall when formed into pipe, is free from hidden defects.

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ELECTRIC WELD LINE PIPE

Other Republic Products include Carbon, Alloy and Stainless Steels—Upson Studs, Bolts and Nuts—Electrunite Heat Exchanger Tubes

OIL AND GAS EQUIPMENT Digest

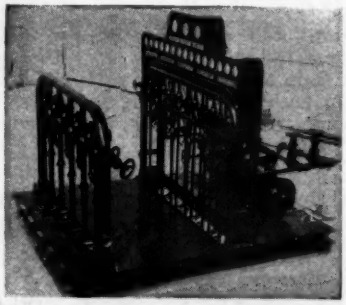
IT'S NEW CHECK IT

by John M. Spears

(1) OXYARC PROCESS hand cuts or pierces stainless and stainless - clad alloy steel, aluminum, bronzes and brasses, cast iron, Monel, Inconel, and nickel. Process achieves cutting by an electric arc and stream of oxygen. Equipment consists of Oxyarc holder and tubular coated Oxycuttend rod which is consumed during cutting. Process can be used wherever an a.c. or d.c. welder and bottled oxygen are available. Requires less than an hour to acquire technique. *Arcos Corp.*

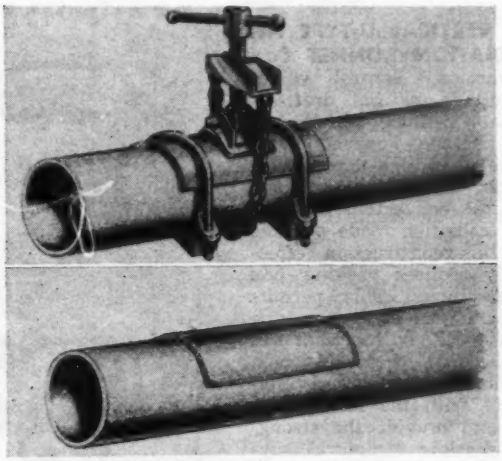
IT'S NEW CHECK IT

(2) FORCED-DRAFT FIRING SYSTEM, for oil-field boilers, employs forced draft, and forced-feed fuel injection. Boilers are fired from one central manifold, through system of gages and valves which control all water, fuel, and draft for each boiler. System consists of forced-draft burners, heavily insulated duck's nests, pressure-tight boiler doors, turbine - driven forced - feed fuel pumps, and an instrument panel or control manifold (illustrated) for each set of boilers. Maximum energy from consumed fuel is obtained through improved combustion, uniform firebox temperature, and by retaining all heat inside the firebox through use of sealed doors. Stack blowers and steam jets are eliminated, thus reducing the amount of steam required from each boiler. *Owen Tool Co.*



IT'S NEW CHECK IT

(3) PIPE REPAIR GASKETS repair pipe - line leaks simply and quickly. Gasket is constructed of cotton cords imbedded in rubber compound shaped to fit pipe. Gasket is cut for any size leak and placed over leak. A plate or sleeve is then placed over the gasket and the repair is clamped tight with a chain jack to shut off leak. After welding, clamps are removed and a permanent repair has been completed. *Gro-Cord Rubber Co.*



IT'S NEW CHECK IT

(4) NEW ROTARY DRILL is rated for 500-ft. drilling with a 4 by 5-in. mud pump and for 1,000-ft. drilling with a 4½ by 6-in. pump. Drill has 20-ft. mast equipped with a hydraulic cylinder for lowering. Pulldown is provided through two continuous 1-in. chains, which also pick up the rod while drilling. Brakes are internal-ex-

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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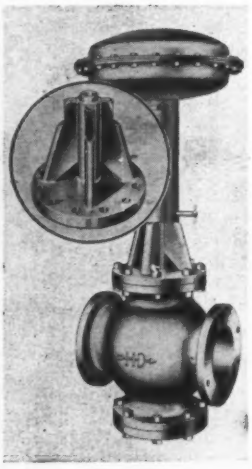
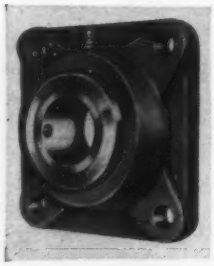
panding type and will handle drill rod. All bearings are self-aligning, ball or roller; chains and sprockets in the main gear case operate in an oil bath. Draw-works drum is independent. Heavy-duty rotary is equipped with Timken bearings which operate in an oil bath. A 5-in. opening through rotary will pass all tools necessary for coring. Three speeds forward and one reverse provide ample selection of rotary speeds to meet all conditions. *Carey's Machine Co.*

IT'S NEW CHECK IT

(5) VERTICAL U-TYPE FIN RADIATION BONNET for diaphragm-control valves permits a natural draft or "chimney effect" which cools the packing-box section of valve when high-temperature fluids are being handled. Natural convection currents plus radiation made possible by this construction effectively reduces packing-box temperatures. This permits efficient use of proper type grease-seal lubricant in grease ring of packing box. U fins are fabricated integrally with the forged bonnet and provide the strongest possible structural support superstructure. *The Hammel Dahl Co.*



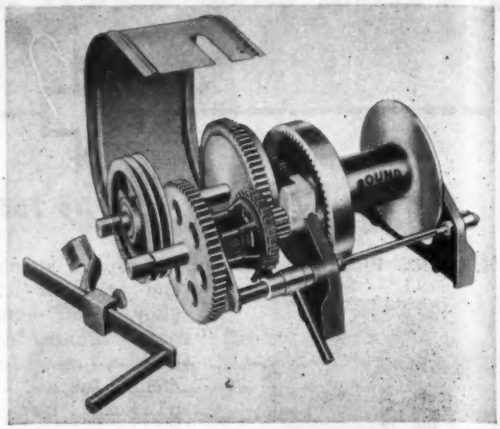
IT'S NEW CHECK IT



(6) SC BALL-BEARING FLANGE is fully self aligning, has deep-groove precision ball bearing with long inner race, improved labyrinth seals, and is suitable for mounting against vertical or horizontal frames and supports. Back face of housing is machined and filling slots are also at back which provides added protection against external dust and dirt. *Dodge Manufacturing Corp.*

IT'S NEW CHECK IT

(7) NEW POWER WINCH is fitted with a V-belt pulley and connected to a 2-hp. reversible-type motor. Unit is equipped with an automatic friction disk-type brake, similar to that commonly employed in electric-hoist construction. This provides necessary safety and control for lowering and suspension of load. Pawl may be lifted from ratchet by means of counterweighted lever releasing friction brake and permitting cable to run out



as rapidly as desired. Crank is supplied with winch for use in case of power failure. *David Round & Son.*

IT'S NEW CHECK IT

(8) TUBE ALIGNING ANCHOR CLAMP provides rigid support for furnace tubes when return-bend body is removed for tube inspection. A split clamp fits around upset-tube ends and is held in position with a single bolt. Once installed, clamp is never removed until it is necessary to replace tubes. Clamp also serves as an anchor for holding members, thus eliminating split ring which formerly was provided for this purpose. *Thornhill-Craver Co.*

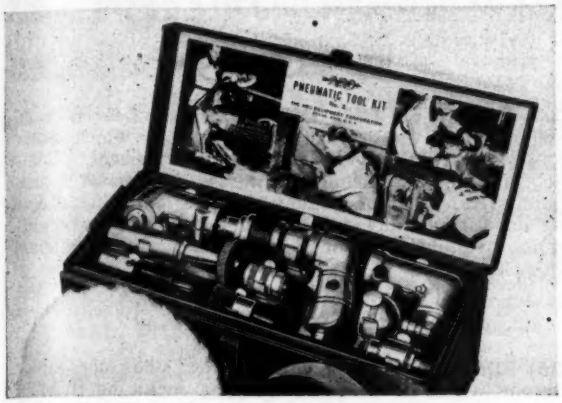
IT'S NEW CHECK IT

(9) AIR-VELOCITY METER measures air velocities as low as 5 ft. per minute and is applicable to measurement of velocities in ducts, wind velocities, flow in air and gas lines, and surveys of heating and air-conditioning systems. Principle of operation is based on a unique combination of the hot-wire and thermopile principles. Pickup element is a noble-metal thermopile which is placed in air stream. Alternate junctions are arranged to have greater cooling than the adjacent junctions which are heated by passing alternating current through the wire. Temperature rise of warmer

junctions is measured by the d.c. thermo-electric voltage generated. *Hastings Instrument Co.*

IT'S NEW CHECK IT

(10) PNEUMATIC MAINTENANCE TOOLS for oil-field truck operators, fleet owners, contractors, garages, etc., include drills from 3/16 to ½-in. capacities, grinders,



wire-brush tools, valve grinders, screw drivers, nut setters, impact wrenches, and rotary files. Field maintenance kits with various tool assortments are available for many maintenance uses. A broad range of speed couplers, finders, bits, chucks, and numerous other accessories complete this tool list. *Aro Equipment Corp.*

IT'S NEW CHECK IT

(11) QUICK-OPENING GATE VALVE, for installation where space is limited, can be operated in a fraction of time required for a screw valve. Valve is designed so that it is narrow from face to face of flanges. Gate is easily removed from valve without disconnecting valve from pipe line, enabling easier cleaning. Made in all cast iron, cast iron with bronze gate, or all bronze, depending on requirements of liquid to be handled. *D. J. Murray Manufacturing Co.*

IT'S NEW CHECK IT

(12) PRESTO-LOCK COUPLINGS are used with any plain-end pipe without threads, grooves, or flanges. Only a hammer is needed to tighten wedge keys after the two sections are fitted over pipe ends and wedge keys have been inserted in key channels. Three simple parts of couplings are the two corrosion-resistant malleable-iron castings and the quick-locking wedge key. Gaskets assure permanently tight seal on all types of pipe lines. Coupling gives up to 40° flexibility at each joint, and acts as a sleeve, elbow, and ball union at all times. Repairs any size leak that the coupling will cover and withstands all normal working pressures of gas, steam, oil, and water. *Drinkwater, Inc.*

IT'S NEW CHECK IT

(13) PIPE BENDER bends cold with no preheating required. Equipment will bend all wrought iron and steel pipe up to 3-in. diameter and solid bars and conduit up to 2 in. No elbows or fittings are needed, and a complete bend can be made in a matter of minutes. Hydraulic pressure bends pipe so gradually and applies pressure so evenly there are no kinks, cracks, or wrinkles in bent pipe. Pressure is applied by a pumping lever which requires but one hand to operate. *Ameraco Industrial Specialties.*

IT'S NEW CHECK IT

TRADE LITERATURE

(14) METERS AND CONTROL INSTRUMENTS. A 15-page catalog covers 27 different instruments, control systems, regulating valves, and desuperheaters. Applications and operating features accompany each illustration of a unit. *Republic Flow Meters Co.*

IT'S NEW CHECK IT

(15) BRONZE AND IRON VALVES. Valves, sluice gates, shear gates, indicator posts, floor stands, etc. for all purposes and pressures and in all sizes are completely covered in 19-page catalog. Price and dimension list included. Illustrated. *Chapman Valve Manufacturing Co..*

IT'S NEW CHECK IT

(16) MEDIUM-DUTY POWER RELAYS. New 20-page catalog describes and illustrates small-power relays and medium-power relays, together with other pertinent in-

formation regarding method of selecting relays, operating characteristics, contact circuit arrangements, and contact ratings. *Signal Engineering & Mfg. Co.*

IT'S NEW ✓ CHECK IT

(17) STEELFLEX COUPLINGS. New 3-color, 30-page bulletin features Steelflex couplings with grid-groove design. Bulletin is tabbed for quick reference under headings: simplified selection, formula selection, dimensions, and how to order. Includes many tables and sectional drawings. *Falk Corp.*

IT'S NEW ✓ CHECK IT

(18) SWITCH VALVES. New bulletin contains description and diagrammatic drawings for switching the flow of hot liquids or vapors from one processing chamber to another without interruption of continuous flow, and without delay due to "coking up." *Wilson-Snyder Manufacturing Division, Oil Well Supply Co.*

IT'S NEW ✓ CHECK IT

(19) HEAVY-DUTY TRUCKS. New illustrated folder describes 10 and 12-ton trucks, built for heavy-duty service. Features the four-wheel-drive principle which allows unrestricted application of power to all four wheels at all times. Illustrated in color. *Four Wheel Drive Auto Co.*

IT'S NEW ✓ CHECK IT

(20) FILES AND RASPS. New 68-page catalog describes and illustrates files and rasps for every use. Covers American and Swiss patterns and the sizes of each. Illustrations show actual coarseness of all types. An excellent file-reference handbook. *Nicholson File Co.*

IT'S NEW ✓ CHECK IT

(21) FACTS ABOUT L.P. GAS. Pocket-size booklet gives the ABC's of degree-day influence on adequate L.P. gas service. Includes charts, graphs, and weather maps of United States. Explains problems and tests of L.P.G. use. Information contained in 24 pages. *Southern Gas & Equipment Co.*

IT'S NEW ✓ CHECK IT

(22) BULK TERMINAL METER MANUAL provides a helpful guide in avoiding and correcting problems which may arise in petroleum metering. Features installation, operation, and maintenance of meters and accessories. Includes wash-drawing illustrations of various installations, performance-characteristics tables, and dimension charts. Will assist plant engineers, bulk terminal operators, service and maintenance men in metered operations. *Ralph N. Brodie Co.*

IT'S NEW ✓ CHECK IT

(23) FOAMGLAS INSULATION, for high-temperature tanks, towers, and ducts, is covered in 24-page pictorial booklet. Proper method of installation to insure maximum utilization of its physical properties is featured. Typical specifications and details are included. *Pittsburgh Corning Corp.*

IT'S NEW ✓ CHECK IT

(24) PARADYNE FUEL IMPROVER. New seven-page technical bulletin describes new product which functions as a gum solvent and "upper lubricant." Complete information includes features of material which inhibits formation of gummy deposits; aids in removing deposits already formed around valves; and helps to improve lubrication of the working parts of an engine. *Enjay Co., Inc.*

IT'S NEW ✓ CHECK IT

(25) PUMP SELECTION GUIDE. New two-color folder contains digest of many pump types, including turbine, double suction, nonclog, single-suction, semienclosed, multistage, and mixed-flow-type pumps. Covers application and features of pumps for every use. Illustrated. *Aurora Pump Co.*

IT'S NEW ✓ CHECK IT

(26) FEED-WATER CONTROL DATA. New three-color bulletin gives performance data and lists a number of advantages of the three-element feed-water control system. Shows chart records illustrating operation under difficult conditions and gives a large list of users. A two-olor diagrammatic layout is included in 16 pages. *Bailey Meter Co.*

IT'S NEW ✓ CHECK IT

(27) PIPE-LINE CATALOG. New 55-page loose-leaf bound catalog covers a complete review of pipe-line equipment and supplies. Index lists 231 items. Illustrated with many line drawings and 10 field photographs. A real service to the pipe liner. *Perrault Brothers, Inc.*

IT'S NEW ✓ CHECK IT

(28) GAS LIFT EQUIPMENT. New six-page bulletin describes new universal valve featuring aerated flow —a system combining aeration for unloading; intermitting for production. Aerated-flow chart, intermitting chart, and velocity-pressure chart are included. Illustrated. *Bryan Gas Lift Equipment Co.*

IT'S NEW ✓ CHECK IT

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REFINING

Sohio Plans $10,000,000 Modernization at Lima

PLANS for a $10,000,000 modernization program at the Lima, Ohio, refinery of Standard Oil Co. (Ohio) were announced April 3 by W. T. Holliday, president of the company.

Major item in the program is the construction of a new catalytic-cracking unit. The plans also include construction of a gas plant, water-cooling tower, gasoline-treating and blending facilities and 200,000-bbl. additions to tankage at the refinery.

Holliday pointed out the major part of a year will be needed to complete building plans and that construction permits and satisfactory arrangements for the necessary supply of water for the refinery must be made. The company has been given assurances of sufficient water for the refinery by Mayor William L. Ferguson after a study of local facilities. Eight to 12 months will be taken in the construction itself. Present capacity of the refinery is approximately 15,000 bbl. of crude oil daily with 6,900 bbl. cracking.

The new cracking unit is expected to run 6,000 bbl. daily. I. L. Peterson is manager of Sohio's Lima refinery. It was estimated the new improvements will entail an increase of about 75 men to the refinery force which now numbers 235 men.

"The program of modernization planned by Sohio is expected to provide refinery facilities at Lima that will produce gasoline to meet the full quality requirements of postwar motor cars," said E. B. McConnell, vice president in charge of manufacturing. "In line with Sohio's continued efforts for conservation, the new unit will produce 30 per cent more gasoline per barrel of crude."

Imperial Continues Work on Montreal East Modernization

Completion is expected early in 1948 in the modernization program started last summer at the Montreal East, Que., refinery of Imperial Oil, Ltd.

Refinery crude capacity will be increased from 25,000 to 33,000 bbl. daily with no new products planned at present. Montreal will continue to produce gasoline, fuel oils, and asphalts from skimming and cracking, as in the past.

Existing equipment is being retained and modified to fit in with the modernization scheme. New process units comprise the following:

Crude pipe still, capacity 13,000 bbl. per stream day.

Fluid catalytic-cracking unit, capacity 11,000 bbl. per stream day, without preheat coil to operate at a reactor temperature of 900°-950°. F. and catalytic regenerator temperature of 1,100° F.

Light-ends units including absorber-stripper, natural naphtha stabilizer, debutanizer, depentanizer, and sidestream splitter.

Nonselective catalytic polymer plant, 5,200 bbl. per stream day, fresh feed, with shell and tube-type reactors.

Additional utilities as steam and water-cooling capacity are provided. At the present time the foundations for all units are about completed, and control rooms, pump houses, and similar facilities 25 per cent completed. The process design was prepared by Standard Oil Development Co. with Canadian Kellogg Co., Ltd., the contractor for all the new process units.

New Furfural Unit To Go In Operation This Month

The new Furfural solvent unit now under construction at the Cooperative Refinery Association plant at Coffeyville, Kans., is expected to go into operation late this month, according to Louis C. Brown, chief refinery engineer.

The unit, licensed by Texaco Development Corp. and being built by Process Engineers, Inc., Dallas, will handle 2,200 bbl. daily of 200 vis. neutral at a 2-1 solvent-oil ratio and will cost about $700,000. Construction began September 1, 1946.

Work Well Under Way On East Chicago Plant

Erection of tankage, building construction, and laying of foundations for new process equipment is expected to get under way early this summer in the $18,000,000 modernization project of Cities Service Oil Co. at its East Chicago, Ind., refinery.

Process-design work is nearly complete, and the mechanical design is well advanced, with much of the material already ordered. Areas already have been cleared, and grades and

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The EXCEL-SO separator eliminates water, and filters with the amazing efficiency of 99.999% debris and microscopic solids from petroleum product streams.

Apply the EXCEL-SO separator to your own products handling problems and see a money-saving increase in the efficiency of performance and added long life of meters, valves, pumps, heat exchangers, and the prevention of dirty tanks.

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firewalls for additional storage tanks have been completed.

Two major process facilities to be built are a Fluid catalytic-cracking unit with a gas-recovery plant and a delayed-coking unit. The cracking unit, which will handle a daily heavy-gas-oil charge of 14,760 bbl., is expected to cost about $7,000,000. Cost of the delayed coker is estimated at $3,000,000, with the remainder to be spent for auxiliary facilities, including a new 54-in. water line from Lake Michigan and tankage for product storage.

Lion to Complete New Cracking Unit in Fall

Completion of Lion Oil Co.'s new, ultramodern Thermofor catalytic-cracking unit at its El Dorado, Ark., refinery is expected early this fall, according to T. H. Barton, president.

The unit will process about 4,500 bbl. daily of gas-oil charging stock to produce high-quality motor fuel. Preliminary engineering work was completed in March 1946 and the pouring of foundations begun in September.

This year the company will manufacture an outside-gear lubricant and a new asphaltic pipe-and-tank enamel, both of which were developed last year, according to the company's annual report. Lion now is operating, as lessee, the Government-owned ammonia plant near El Dorado. The plant formerly was operated under a cost-plus arrangement for the Army's Ordnance Department by Lion Chemical Corp., wholly owned subsidiary.

Dow Cuts Back Building Program on Gulf Coast

Because of shortages of materials and high building costs, Dow Chemical Co. is cancelling or deferring approximately a third of its huge Gulf Coast expansion program.

Dr. A. P. Beutel, head of Dow's Texas interests, said in Freeport that it had become practically impossible to meet scheduled completion dates. "Also with the continuous increase in cost of material and labor since the program began, actual costs are running much higher than originally estimated," he said.

It had been estimated Dow's originally planned program would involve expenditure of some $150,000,000. It includes production of styrene, magnesium, and various petrochemicals.

Safety Manuals Issued

Safety-data publications on acetylene and anhydrous ammonia, the seventh and eighth in a series of chemical-product safety manuals, are now being distributed by the Manufacturing Chemists' Association. Designed for supervisory staffs and management, the manuals present essential information for the safe handling and use of chemical products.

Texas Co. Plans Beacon Laboratories Expansion

Plans for construction of a new mechanical-engineering building, a new chemical laboratory, and a cinder-block test cell for fundamental studies of gas-turbine fuels have been announced by The Texas Co.

The new construction, to cost an estimated $400,000, will expand the company's Beacon Laboratories and is scheduled to get under way this year. Rough plans, from which construction plans will be designed, already have been completed.

Railroad Gets New Diesel

The M.K.T. Railroad has announced receipt of a 4,000-hp. diesel passenger locomotive which, the company said, will reduce time schedules a third between St. Louis and Texas points. The locomotive consists of two units, each powered by two 1,000-hp., 12-cylinder engines. It will be placed on a St. Louis-San Antonio run after a series of tests.

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PIPE LINES

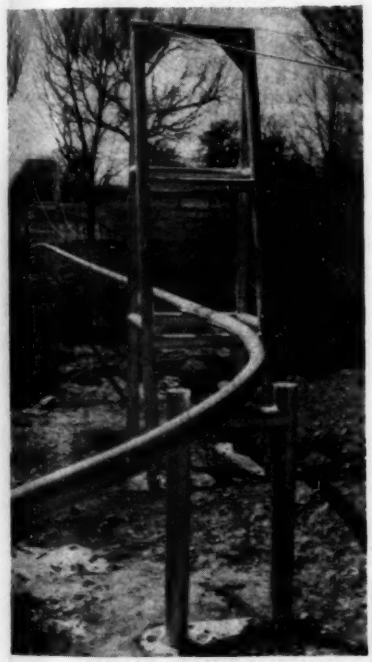
Borger-La Junta Contract Let by Phillips-Shamrock

Phillips Petroleum Co. and Shamrock Oil & Gas Co. have let contract to H. C. Lile Construction Co. for 215 miles of 6⅝-in. o.d. refined products line from the refinery at Borger, Tex., to be laid on a route via the Shamrock refinery at McKee, Tex. (between Dumas and Sunray) to La Junta, Colo.

The project is being handled for its entire extent by a partnership arrangement between Phillips and Shamrock. Engineering, construction, and operation are handled by the Phillips organization. The 215-mile line for which the contract has just been let to Lile is to be part of a 365-mile line to be finally completed between Borger via La Junta to Denver.

The three pump stations for the completed system will be located at Borger, McKee, and La Junta. All of the stations will be equipped with Aldrich Pump Co. variable-stroke pumps driven by electric motors.

Reconditioning of 65 miles of 8-in. products line for Phillips Petroleum Co. in Kansas contracted by Bishop & Locke Construction Co. and H. C. Price Co. is more than half finished.



Products-line stream crossing near Bristow, Okla., which is part of the 117-mile, 6-in. line just completed through which initial shipments of products are being made this week. The project is a continuous line consisting of the following sections: Allen-Bristow, 68 miles, owned by Sunray Oil Corp.; Bristow-Drumright, 15 miles, owned by Sunray Oil Corp. and Wilcox Oil Co.; and Drumright-West Tulsa, 34.8 miles owned by Great Lakes Pipe Line Co. Construction and operation of the line is being handled by Great Lakes Pipe Line Co. The line was contracted by Williams Brothers Corp.

Shell Awards Contract For Sheridan Line

Shell Pipe Line Corp. has awarded a contract for laying the 102-mile, 6-in. Sheridan-Deer Park, Tex., products pipe line to Smith Contracting Co. The line will transport cycling-plant products from the Sheridan producing area to Shell Oil Co., Inc.'s refinery

Part of the pipe is already on the ground and the remainder is to come according to regular scheduled deliveries. Operations of Smith Contracting Co. are being directed by F. A. Smith, partner in the firm. Construction equipment is being moved to the job. Completion is expected in 90 days.

Tropical Builds 63-Mile Emergency Products Line

Preliminary work is now under way along the right-of-way for the emergency products pipe line being built by Tropical Oil Co. to take care of increased consumption in Colombia. The line is to consist of 63 miles of 6-in. invasion pipe with 0.109 wall thickness to operate at the low pressure of 450 psi. to deliver 6,000 bbl. of products daily. It will extend from the Tropical refinery at Barranca Bermeja southward along the Magdalena River to Puerto Berrio which is the railhead for Medellin. Some of the pipe is being shipped. The work is being done by crews of Tropical Oil Co. Engineering work for the project, including line, pump station, and terminal, was done by Floyd E. Warterfield, Jr., president, Oklahoma Engineering Co.

The pump station at Barranca Bermeja is equipped with two units, one of which will be a standby. Each

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of these will have a D-17 Caterpillar diesel engine driving a Gaso reciprocating pump. The project will have equipment for calibrating, metering, etc., which is characteristic of modern products pipe lines. Departures from current commercial products line practices consist of the use of reciprocating units and invasion pipe.

Sohio Extends Air Patrol Of Pipe-Line System

Sohio Pipe Line Co. recently established airplane patrol of 250 miles of lines in Michigan preparatory to extending the operation to patrolling 2,000 miles of crude-oil, products, and natural-gas lines operated by Sohio interests in other states including Indiana, Illinois, Ohio, and Oklahoma.

This work is carried on under the direction of E. F. Morrill, vice president. A complete inspection of the Sohio system will be made by one pilot in 5 days.

Report Shows Increased Shipments and Receipts

Pipe-line revenue and volume in the fourth quarter of 1946 surpassed the corresponding 1945 quarter by 9 per cent, according to report prepared by the Interstate Commerce Commission from statements of 44 leading pipe-line companies.

Fourth-quarter volume for the lines reached 536,991,898 bbl., against 489,936,104 bbl. in the final 1945 quarter, while revenue rose to $69,872,778 as compared with $63,966,200 in the 1945 period.

Stanolind Pipe Line Co. registered the largest volume increase percentagewise among the major lines, up 16.6 per cent from the 1945 period to 28,103,126 bbl. Stanolind was closely followed by Gulf Refining Co., up 16.3 per cent to 34,353,696 bbl., and Sohio Pipe Line Co., up 16.3 per cent to 21,436,749 bbl.

Other large lines showing volume gains in excess of 3,000,000 bbl. in the period were: Buckeye Pipe Line Co., Humble Pipe Line Co., Magnolia Pipe Line Co., Ohio Oil Co., Sinclair Refining Co.

Humble registered the highest volume and receipts, amounting to 61,142,908 bbls. and $7,478,107, respectively.

Great Lakes Pipe Line Co. had the largest percentage increase among the higher revenue lines, up 29 per cent to $3,431,830 on volume totaling 8,088,106 bbl. Stanolind was second with 17.2 per cent and was followed by: Gulf Refining, 14.4 per cent; Magnolia Pipe Line Co., 10.6 per cent; Sinclair Refining, 3 per cent; and Texas Pipe Line Co., 2 per cent.

The largest percentage increase in revenue among the 44 companies was

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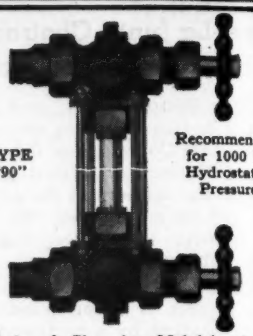

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registered by Kaw Pipe Line Co., up 45.1 per cent. National Transit Co. was next with 41 per cent, and Utah Oil Refining Co. revenue was up 40.7 per cent.

Interstate Contracts With Associated for Lines

Interstate Oil Pipe Line Co. has contracted with Associated Contracts & Engineers for the laying of two crude-oil lines in Adams County, Mississippi. These consist of 10 miles of 6-in. and 8 miles of 4-in. Work is now under way.

Sunray Lays Crude-Oil Gathering Lines

Sunray Oil Corp. has completed a 12-mile, 4-in. line from Albright pool to the company's Allen, Okla., refinery.

A 7¼-mile, 6-in. crude-oil line, contracted for Sunray by Pipe Line Service Co., Seminole, Okla., is completed with the exception of river-crossing work which is being done this week at the South Canadian River where the line is being laid 24 in. below the stream bed.

Panhandle's Purging Operation Successful

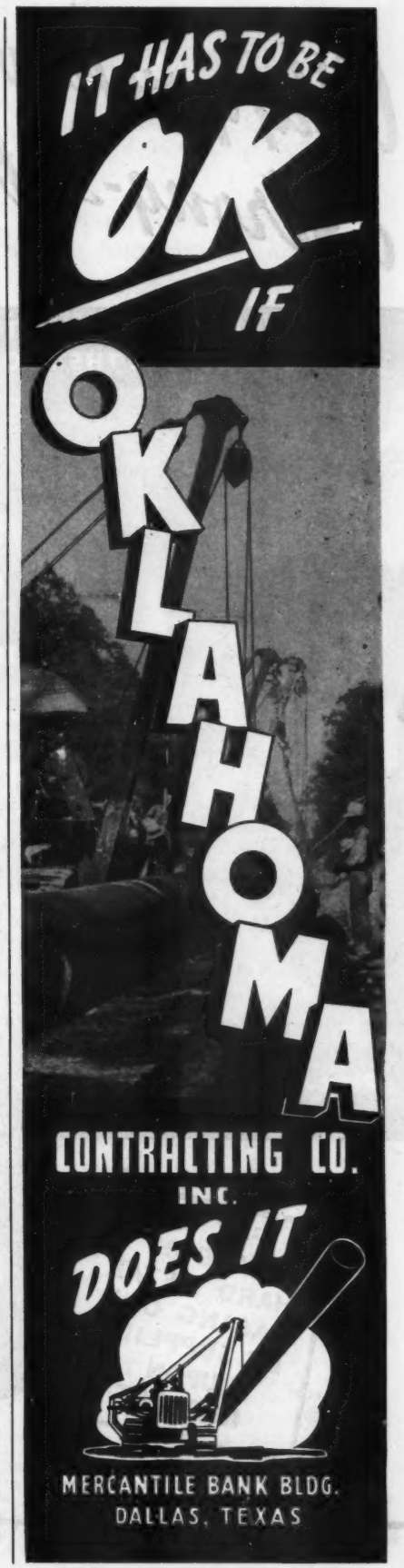
In the largest operation of Panhandle Eastern Pipe Line Co. for cleaning the interior of pipe lines, the throughput efficiency was increased between 2.1 and 13 per cent (averaging 6 per cent) as the result of operations carried on over two sections of line totaling 566 miles.

The estimated increase in capacity gained during the purging operation was 10,000,000 cu. ft. daily which contributed substantially to the effectiveness of the Panhandle system during the severe demands of the 1946-47 season.

A go-devil having a rate of speed of approximately 60 m.p.h. was used. It has been designed and patented by D. K. Stephens, superintendent of transmission pipe lines of Panhandle Eastern.

Oil was found in every joint of the pipe removed. Though oil does not seem to affect the efficiency of clean lines, pipe walls that have oil-saturated scale or other foreign matter accumulate dirt and lose efficiency.

A continuous improvement in operations was noted as the cleaning progressed. The time lost while cleaning the line was continually decreased until a time of maximum efficiency was reached. The average time lost when a line was out of service was 4 hours and 40 minutes.



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NATURAL GAS

Appalachian Industrial Service Back to Normal

Gas supplies for industrial plants which were drastically curtailed several weeks ago in various Appalachian areas were returning to normal last week, although permanent relief for future shortages awaits construction of additional pipe-line capacity.

In Pittsburgh, two companies, Equitable Gas Co. and Manufacturers Light & Heat Co., restored service to several hundred consumer companies, while a third gas company, Peoples Natural Gas Co., increased supplies to industrial plants to 75 per cent of December quotas. Warmer weather made the restoring of service possible.

Indicative of the general lack of facilities to meet heavy demand for gas in the eastern area was the action of United Natural Gas Co. in filing with the Pennsylvania Public Utility Commission a new regulation allowing it to defer service for certain new space-heating requirements. A company official pointed out the regulation is intended to safeguard service to present customers. Under it, the company will defer service when it is proposed to change from use of another fuel for space heating. It was emphasized the regulation will continue only until gas-transportation facilities can be enlarged.

Hearing Set in Denver

The Federal Power Commission has set for April 21 in Denver, Colo., a hearing on application of Colorado Interstate Gas Co. and Colorado-Wyoming Gas Co. Colorado Interstate is asking authority to construct a 240-mile, 20-in. line from Denver to a proposed compressor station near Lakin, Kans., at a cost of $12,000,000. Colorado-Wyoming is asking permission to build 105 miles of 8 and 10-in. line connecting with the proposed line of Colorado Interstate and a 1,200-hp. compressor station, to cost about $1,415,000.

Big Inch Allocation Changed

WASHINGTON.—Tennessee Gas & Transmission Co. has been authorized by the Federal Power Commission to divert 1,500,000 cu. ft. of Big Inch gas per day from Carnegie Natural Gas Co. to Columbia Gas & Electric Corp. to aid in alleviating a gas shortage resulting from low temperatures prevailing in the Appalachian area. The authorization will remain in effect until the commission takes further action.

El Paso Natural to Loop 17-Mile Arizona Line

WASHINGTON.—The Federal Power Commission has granted temporary authorization to El Paso Natural Gas Co., El Paso, Tex., to construct and operate 17 miles of 6-in. natural-gas line to loop the company's 8-in. gas line serving Morenci, Ariz.

The line will provide an increased supply of natural gas on an interruptible basis to Phelps Dodge Corp. for use in its mine and smelter near Morenci. The commission authorization was granted in response to a telegraphic request from the El Paso company on the condition that a formal request be filed within 10 days. The El Paso company stated that it had the necessary pipe on hand and would be able to complete the looping operation within 3 weeks.

FPC Hears T.G.&T. Plans for New Gas Lines

WASHINGTON.—The Federal Power Commission last week heard testimony on the application of Tennessee Gas & Transmission Co. to build 552 miles of 26-in. natural-gas pipe line paralleling its line from Hidalgo County, Texas, into West Virginia.

Total cost of the project has been estimated at $53,000,000. The new work would reinforce the existing line and would include a 348-mile stretch from Texas into Louisiana.

Increase Shown in 1946 Canadian Gas Output

OTTAWA.—Official figures just issued by the federal Department of Trade and Commerce show that natural-gas production marketed from all Canadian fields in 1946 totaled 52,314,494,000 cu. ft. against 48,411,585,000 cu. ft. in 1945. The total does not include Turner Valley gas used for repressuring, or waste gas burned in the field.

FPC Hearing Set April 15

WASHINGTON.—The Federal Power Commission has set a hearing for April 15, in Washington, to consider the application filed jointly by Home Gas Co., Manufacturers Light & Heat Co., Cumberland & Allegany Gas Co., and Natural Gas Co. of West Virginia for authority to construct additional gas pipe-line facilities. The companies are members of the Pittsburgh group of Columbia Gas & Electric Corp.

Northern Natural's St. Paul Sale Authority Extended

WASHINGTON.—The Federal Power Commission has extended to October 1, the term of the temporary authorization under which Northern Natural Gas Co. is permitted to sell natural gas to Northern States Power Co. for resale in St. Paul, South St. Paul, West St. Paul, and Rosetown, Minn. The authorization limits Northern's sale to Northern States Power to the volumes of natural gas required in excess of the gas supplied by Koppers Co. under contract to Northern States Power.

Now pending before the commission is application filed by Northern Natural for authorization to supply natural gas to Northern States Power to meet its entire gas requirements in serving St. Paul, West St. Paul, and South St. Paul.

Continued Increase Shown In February Gas Sales

Sales of natural gas during February totaled 2,538,409,000 therms, showing a gain of 10.2 per cent over the same month of 1946, according to the monthly report of the American Gas Association.

The A.G.A. pointed out that extended periods of low temperature during the month increased house-heating load demands on the entire gas industry to a point where production and transmission facilities were severely taxed. In the natural gas areas, degree days were 20.6 higher.

The over-all gain in sales during February was 11.2 per cent for all branches of the gas utility industry. Total sales were 2,951,150,000 therms.

Railroad Commission Sets April Gas Allowables

Sweet gas allowables for April for 11 fields have been fixed by the Texas Railroad Commission. They are, in cubic feet daily: Carthage 360,251,800, Blue Lake 5,000,000, Navarro Crossing 6,109,141, North Louise 5,910,000, Sipe Springs (high pressure), 1,333,333, La Blanca 7,784,367, McAllen 15,000,000, Alief 4,000,000, Eden 166,667, Rodessa 29,121,667, and Whelan 50,844,667. The commission's emergency order, granting Lone Star Gas Co. permission to produce 60,000,000 cu. ft. of gas a day in excess of its daily allowable in the Carthage field, was extended until May 1.

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Exploration and Drilling

Trends in Discovery Thinking

Charles J. Deegan

WITH the whole world oil conscious, and more interested in the work of the exploration scientists than at any previous time in the petroleum industry's history, this is a good time to report on the trends in thinking among the men who have the responsibility for finding new oil fields.

The first thing that is apparent is that the interest of the general public has thus far made little impression on the exploration scientists. They recognize the existence of this interest and its growth, but that recognition is rather vague. The geologists, geophysicists, and paleontologists are too busy thinking in terms of their scientific problems, and the commercial aspects of those problems, to pay much attention to other things.

The general trend of their thinking about discoveries at any given time can be seen most clearly at annual-meeting time, when they come together from all parts of the country. In part, the trend is then revealed by the type of formal program prepared; in part by the attendance during the presentation of particular papers, or types of papers. But, it stands out most clearly in the informal discussions that go on in the foyers and halls outside the meeting rooms.

Right now the outstanding characteristic of all discussions is the pattern of discussing the local prospect in terms of its larger regional environment. There is general agreement among all three groups that correct interpretation of local evidence hinges on understanding the relative position of that local area in a framework of its regional environment. While there may be many possible interpretations of the data on the local prospect, considered alone, there are fewer possible interpretations, if those data must fit logically into a certain known regional environment.

This habit of thinking and choosing an approach to interpretation of data does not always simplify the problem. Sometimes it seems to make it more complicated, because then, too often, the correct analysis of the situation hinges on some rather obscure minor point. This happens because that minor point is the key factor in differentiating between alternate possibilities that fit the known regional environment.

The geophysicists are working on approaches to this type of thinking. One, simple in concept, complicated in application, is more use of mathematical techniques to check interpretations of anomalies. There is a noticeable trend toward development of new and more sharply defining mathematical techniques to bring about better segregation of possible interpretations. With more clean-cut alternative interpretations, the geologist is in a better position to point out which interpretation best fits the known regional geological environment.

The second approach of the geophysicist is a backtracking over old work to find out where interpretations went wrong in the light of subsequent developments. As a result improvements are noted in two directions: one a sharpened eye toward picking out significant, but not too conspicuous clues in the records of observations; the other the development of field techniques to pick up additional data in the critical areas.

The third approach is the development of entirely new techniques in the field application of the known instruments, plus new techniques in the mathematical analysis of the observed data. These reveal fairly clearly two or more separate components of what previously could be determined only as one lump sum. There are times when this segregation of components is the key factor in giving the geologist the exact information he needs to solve the geological interpretation of the geophysical data.

The paleontologist is no longer merely an identification specialist in a narrow field. He is now the stratigrapher, the sedimentologist, and the authority on paleogeography. At least he does the primary work in these fields. The results are obvious. The change is from a narrow specialist in the identification of minute objects, to a broad thinker who builds up a picture of a regional sedimentary environment from clues obtained through his knowledge of these fossils.

With the enlarged scope of the geophysicist and the paleontologist, a change is noticeable in the geologist. As much of his work is taken over by the new branches of earth science, or is done for him by various mechanical gadgets, such as logging devices, his function becomes more and more that of an integrator. His is the responsibility of integrating all the evidence now available, both new and old, into a consistent geological picture, and then interpreting that picture in terms of prospective oil finding.

Perhaps one of the most significant trends in discovery thinking evident this year goes something like this. Nature has permitted accumulation of oil in many different ways, each of which has its own particular type of evidence of existence.

The oldest known, and easiest found, are those pools which disclose their existence by surface seeps. Then come the pools in which accumulations conform fairly closely with easily checked surface structures. More difficult, but still relatively simple, are oil fields conforming closely to structures that are not clearly apparent on the surface, but which can be suspected from the surface, and detected by either simple geophysical methods or even simple core drilling.

From this point on the types of accumulation become more complicated and the evidence and clues to their existence become fainter.

The geologist has progressed steadily from the simple to the complicated; from the easily seen to the carefully hidden. Periodically someone develops a new instrument, or a new interpretation technique, which permits him to find successfully a certain type of oil accumulation. After a while he has worked over all the old territory in search of that type of accumulation and reaches the point of diminishing returns. Then he needs something new.

The current concept is that all the known types of oil accumulation are not necessarily all the types that exist. There are probably other types of fields yet to be found. There must exist clues to new types of fields, even if they are not recognized as yet.

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TEXAS GULF COAST

Two New Pools Pace Successful Week

HOUSTON.—A new oil field for west-central portion of Wharton County, approximately 3½ miles southwest of Lakeview-Hutchins production and 2 miles east of North Louise gas field, has been opened by Grubb & Hawkins. The 1 Rudolph C. Peters, located in Lyman Conkrite Survey, gaged a potential of 105 bbl. of pipe-line oil through an 8/64-in. positive choke with 400 psi. flowing pressure on the tubing. It is 22.8°-gravity green oil. On the second 24-hour flow test, the well gaged 110 bbl. daily through the same-sized positive choke. At time of completion it had an estimated gas ratio of 100. Total depth is 5,503 ft. in Vicksburg shale. A potential gage is being made and a discovery allowable has been granted by the Railroad Commission.

Continental Oil Co. 1-D Albert West, new field discovery in Live Oak County, about 3½ miles northwest of George West and 2½ miles southeast of Kittle, flowed an initial gage of 22.4 bbl. of condensate per day through a 5/32-in. choke on 18-hour test, with gas-condensate ratio 41,500, making 3,000,000 cu. ft. of gas per day. Shutin pressure on tubing was 2,350 psi. Production is through perforations at 6,780-93 ft. in the bottom part of the Slick sand, which was topped at 6,765 ft. The Luling sand at 6,980-85 ft. and the Massive Wilcox zone from 7,291-96 ft. also tested oil and salt water but these zones were not given a production test. This new field opener is located in the George West Subdivision of J. Poitevent Survey, Abstract 327.

A new deeper gas-condensate pay zone at the new Wyrick field of Refugio County has been opened by The Clymore Co., Inc., at 3 John L. Zarsky. This well is located in Johnson & Pugh Subdivision of Bonnie View Ranch, 933 ft. southeast of the 1 Zarsky gas-discovery well and approximately 1,500 ft. south-southeast of the 2 Zarsky gas-discovery well, both of which produce from the 4,950-ft. pay. The new pay is the 5,840-ft. sand and well flowed approximately 35 bbl. of condensate and 10,000,000 cu. ft. gas per day through choke. Total depth is 6,408 ft. with the 5¼-in. casing set to 5,990 ft.

Humble Oil & Refining Co.'s deep exploration in Sugarland field of Fort Bend County, 16 Brazos farms, in William Little Survey, now has been completed as an oil well in the field's upper sands. The test was drilled and abandoned in the latter part of 1945 at which time it was turned to the geophysical department for experimental purposes. It topped the salt at 3,845 ft. and was drilled to a total depth of 10,000 ft., still in the salt. Well was recompleted for a potential gage of 267 bbl. of 28°-gravity oil daily through a ¼-in. choke, having a gas ratio of 272. Flowing pressure on tubing was 240 psi. and 415 psi. casing pressure. Sands are from 3,510-80 ft. with 161 perforations shot from 3,543-70 ft. for completion.

S. E. McDaniel 1 Ove Wooten et al, in John A. Davis Survey, is second oil well in the northeast extension discovery area of Conroe field, Montgomery County. It flowed a potential gage of 160 bbl. daily through a ¼-in. choke with 180 lb. flowing pressure, gravity 38° corrected, and gas ratio 750. No water in the flow. Total depth is 5,146 ft., and production is through 72 holes perforated at 5,058-72 ft. in the Cockfield.

Superior Oil Co. 1 Agnes Resher, deep wildcat exploration in the West Conroe area of Montgomery County, in Denward Jones Survey, 2½ miles southeast of production at Northwest Conroe and 1½ miles west of Conroe townsite, has been completed dry after running log with a total depth of 10,501 ft. Shows were reported in the upper Wilcox sands at 8,100, 8,200, and 8,500-ft. levels where gas and condensate odors were sampled, but they had salt-water taste. Some minor shows were also picked up in samples from the Cockfield sand stringers between the 3,800 and 4,800-ft. levels.

The name Salem has been given the new gas field discovered by The Texas Co. 1 George E. Scott in the William Minter Survey of Victoria County. This was reported by the nomenclature committee of South Texas Geological Society.

There were 11 new wildcat starts this week, 1 each in Bee, Brazoria, Chambers, Colorado, Gonzales, Jackson, Karnes, Lavaca, Matagorda, Orange, and Tyler counties. Twenty-five new development starts were reported with West Ranch, Jackson County, receiving the greatest number, 11. The 28 completions included 19 oil wells, 2 condensate, 1 gas and 6 dry holes, of which one was a new gas pool discovery in Wharton County, and 2 were dry wildcats, 1 each in Brazoria and Montgomery counties.

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TEXAS GULF COAST SUCCESSFUL WILDCATS

Wharton County: New gas pool, Prasifka field—Cockburn Oil Corp. 1 Wharton Bank & Trust Co., AB&M Sur. 2, Abst. 452, 3 mi. S of Lane City townsite, 3½ mi., NE of Withers prodn. and 3½ mi. E of Lane City field, TD 5,720 ft., top sand 4,526 ft., perf. 4,526-36 ft., IP 897,000 cu. ft. gas per day through ¼-in. choke, and 5,000,000 cu. ft. gas per day on open flow, TP 1,270 lb., SITP 2,000 lb., gas, no water.

TEXAS GULF COAST WILDCAT FAILURES

Brazoria County: Seaboard Oil Co. of Delaware 1 John L. Jones, in West Manvel area, Oliver Hall Sur., Abst. 203, 3½ mi. SW of Manvel field production, dry, TD 8,631 ft.

Montgomery County: The Superior Oil Co. 1 Agnes Risher et al, in Denward James Sur., Abst. 289, 2½ mi. SE of NW Conroe production and 1½ mi. W of Conroe townsite, dry, TD 10,501 ft.

N. CENTRAL TEXAS

Three Tests Prove Successful

WICHITA FALLS.—Mudge Oil Co. 1 M. K. Graham, Throckmorton County wildcat, 4 miles northeast of Woodson, became a Caddo limestone producer after attempts in the Mississippi and Marble Falls failed. Drilled to 4,702 ft., 22 ft. in the Mississippi, an acid treatment from 4,697 ft. to total depth resulted in swabbing 16 bbl. of oil and 53 bbl. of water in 24 hours. Operators then plugged back to 4,470 ft. in the Caddo.

From casing perforations at 4,455-68 ft., acidized, it swabbed approximately 2 bbl. of oil in 24 hours, and was again plugged back to the upper Caddo at 3,890 ft. From 3,880-85 ft. it tested only a rainbow show of oil before acid was used, but after treatment with 1,000 gal. it flowed acid water immediately, then kicked off and flowed 30 bbl. of oil an hour through open 2-in. tubing. It was allowed to flow into tanks but the amount of oil recovered was not disclosed. Further tests, through ¼-in. tubing chokes, produced a flow of about 10 bbl. of oil an hour.

In Jack County, northeast of Bryson, Thomas E. Berry et al 1 Mrs. D. C. Clayton, Mississippian pay discovery in the Bryson field, was completed for 141.7 bbl. of oil in 3 hours through 32/64-in. choke. Gas-oil ratio was 1,000:1. Total depth was 5,154 ft., with top of the Mississippian at 5,073 ft.

A recompletion in the northwest section of the Walnut Bend field of Coke County was said to have added a new pay zone at 4,490-4,515 ft. The test was The Texas Co. 3 Gainesville National Bank, in the T. W. Ward Survey, A-1089, which was originally drilled to 5,485 ft. in 1945. Initial potential from the new zone was 292.56 bbl. of oil a day through 11/32-in. tubing choke.

Three miles southeast of Montague, in Montague County, Continental Oil Co. 1 Magee was ready to test the conglomerate zone on last report. Electric-log tops were: Strawn sand 6,018-40 ft., Caddo 6,228 ft., conglomerate at 6,290-6,318 ft. and 6,473-94 ft., Marble Falls 6,536 ft., and the Barnett shale at 6,576 ft.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: Reinhold Genshorek 1 W. E. Wolffe, M. H. Finch Sur., 1½ mi. SE Mankins, dry, TD 2,004 ft. in shale.

Neeld & Hood Drilling Co. 1 H. Kunkel, W. E. Probert Sur., 4 mi. NE Megargel, dry, TD 1,477 ft. in sand with show of oil, water.

Baylor County: Youngblood & Foree 1

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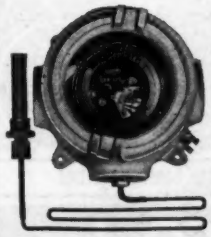

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A. M. Huskinson, Sec. 9, Blk. 1, D&W RR Sur., 2½ mi. W Bomarton, dry, TD 1,790 ft. in hard limestone.

Clay County: J. G. Fowler 1 Tommie Taylor, E. T. Mitchell Sur., 3 mi. NW Charlie, dry, TD 2,526 ft., Canyon 2,368 ft.

Frank Wood et al 1 Tommie Taylor, Blk. 2, Specht & McCutcheon Subd., 4 mi. NW Charlie, dry, TD 2,505 ft. in shale.

Cooke County: Virgil Taylor Drilling Co. 1 H. M. Ramsey, M. French Sur., 5 mi. NE Gainesville, dry, TD 2,606 ft.

Wichita County: Consolidated Oil Co. 2 Alice Daves, Blk. 14, Denton Co. School Land, 7 mi. SW Wichita Falls, dry, TD 632 ft.

WEST CENTRAL TEXAS SUCCESSFUL WILDCATS

Shackelford County: Roark, Jones & Stasney 1 W. H. Green, Sec. 48, Blk. 11, T&P Sur., 7½ mi. SW Albany, pumped 6 bbl. 40°-gravity oil a day, Palo Pinto 2,984-90 ft. and 3,012-18 ft., TD 4,840 ft., PB 3,048 ft.

Stephens County: Fred M. Manning, Inc., 1 A. W. Mueller, Sec. 2,258, TE&L Sur., 10 mi. SW Breckenridge, Loving-Ibex area, flowed 151 bbl. 44°-gravity oil a day through ¼-in. choke, casing pressure 1,100 lb., tubing pressure 900 lb., GOR 20,000:1, Caddo 3,361-66 ft., TD 4,232 ft. in Ellenburger, PB 4,170 ft., elevation 1,278 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Haskell County: Anderson Prichard Oil Corp. 1 Emma Terrell, Elias Gilpin Sur., 1 mi. NE Weinert, dry, TD 4,980 ft. in sandy shale, top Strawn 4,510 ft.

Throckmorton County: Panhandle Refining Co. 1 Beulah Burgess, Sec. 3,045, TE&L Sur., 6 mi. NE Throckmorton, dry, TD 5,032 ft., Caddo 4,339 ft., Mississippi 4,862 ft.

CALIFORNIA

Prospective Extension To Coalinga Field

LOS ANGELES.—The Sharples Oil Corp. is apparently extending the Coalinga field to the northeast with its 1 Hyde, 6-19s-16e, Fresno County wildcat. An electric log indicated oil saturation at 8,280-84 ft. and 8,304-26 ft., and operators are running 7-in. casing to set on a plug at 8,380 ft. The casing will be gun-perforated opposite the two zones for production. Total depth is 8,900 ft.

On the latest formation test, Seaboard Oil Co.'s prospective oil discovery in the Bacon Hills area of Kern County, the 3-21 Seaboard-Bandini, 21-28s-20e, showed a fair, steady blow for 20 minutes and a heading blow throughout the remainder of the test. The test was of 1 hour duration and was made for water shut-off on the splice with packer set at 7,456 ft. A ⅝-in. choke and 1,492-ft. water cushion were used. Recovery was 2,604 ft. of drilling fluid and gas-cut water showing no salt content. During the test, however, the bottom plug moved downward and operators are now replugging to retest.

During a previous formation test, of 45 minutes duration, the Seaboard well recovered 500 ft. of gassy mud and 500 ft. of clean, 36.7°-gravity oil. Production is from the Oceanic Oil sand at 7,855-80 ft.

Pacific Western Oil Corp. has recovered drill pipe to a depth of 12,300 ft. in its former record-depth well, the 1 National Royalties, 5-26s-22e, wildcat in the Miramonte area of Kern County. A company spokesman announced last week that the hole below this point has been abandoned and that the casing will be perforated between 11,390 and 12,150 ft. for production tests.

Drill pipe became stuck in the 1 National Royalties early this year after the well had reached a depth of 16,668 ft. The pipe has been cut and recovered by stages to the 12,300-ft. mark, but efforts to remove it below that depth have been unsuccessful.

British-American Oil Producing Co. has cemented 7-in. casing at 9,100 ft. in the 3 Bodger, 22-3s-14w, and has cleared out to 9,093 ft. preparatory to making production tests. Oil sand was topped at approximately 9,100 ft. The 3 Bodger may help to tell the story of the new Alondra area, in which only one producer and several dry holes have been drilled. It is believed that a complicated fault condition exists which will take considerable drilling to work out.

Neely-Noonan Operations announced last week that they will soon launch a new exploratory venture in Section 12-23s-26e, in the Terra Bella district of Tulare County. The location of the new venture is approximately 2½ miles northeast of Superior Oil Co. 24-22 Day, an abandoned wildcat which found minor showings near the bottom of the hole at 4,170 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Arvin area: Tide Water Associated Oil Co. 23-9 Tupman, 9-31s-29e, dry, elev. 457 ft., Santa Margarita 7,107 ft., upper Fruitvale 7,177 ft., lower Fruitvale 7,510 ft., Olcese 8,741 ft., Freeman 9,064 ft., TD 9,288 ft.

Cymric area: Independent Exploration Co. 2 Richardson, 18-29s-21e, dry, elev. 1,012 ft., Media sand 1,613 ft., gray Carnerous sand 1,818 ft., TD 2,078 ft.

Jasmine area: Harp & Brown 1 Quinn, 11-25s-27e, dry in gray sand, elev. 765 ft., TD 2,347 ft.

Magunden area: Seaboard Oil Co. 1-5 Garrison-Davis, 30-29s-29e, dry, elev. 545 ft., TD 7,646 ft.

Mt. Poso area: Gene Reid Exploration Co. 1 Marshall, 32-26s-28e, dry, elev. 1,001 ft., Vedder 1,800 ft., TD 1,842 ft.

Mountain View area: Bender Oil Operations 1 B. A. Co., 29-30s-29e, dry, elev. 447 ft., Basal Chanac sand 5,160 ft., 1st Transsition 5,240 ft., Wharton 5,410 ft., Carbonaceous silt 5,467 ft., TD 5,497 ft.

South Belridge area: Union Oil Co. 87X-4 Hopkins, 4-29s-21e, dry, elev. 683 ft., base Tulare 1,160 ft., TD 1,800 ft.

Los Angeles County, Bandini area: C. G. Willis 1 Butler Comm., 15-2s-12w, dry, elev. 182 ft., TD 6,339 ft.

San Luis Obispo County, Nipomo area: Union Oil Co. 1 Vernon Wineman, 19-11n-33w, dry, elev. 700 ft., TD 972 ft.

Tulare County, Earlimart area: Pacific Central Oil Co. 1 Divizich, 13-24s-25e, dry, TD 5,636 ft.

Trico area: Lebow & McNee 1 Bolz, 19-24s-23e, dry, elev. 215 ft., TD 3,500 ft.

SOUTHWEST TEXAS

New Oil Pays In Two Fields

CORPUS CHRISTI.—A new oil zone discovery in the middle of the gas-condensate production at Stratton field, in Nueces County, has been opened by G. E. Sullivan 1 fee. The well gaged 32 bbl. of 43°-gravity oil per day through a 5/32-in. choke with 50 psi. tubing pressure and 210 psi. casing pressure. Gas-oil ratio is 971. Production is through perforations at 5,875-87 ft. Top of the pay zone is 5,855 ft., and total depth is 7,020 ft., with 7-in. casing on bottom. This well is located in the east 480 acres of Section 5, Charles E. Stratton Subdivision.

Magnolia Petroleum Co. 1-A El Contesto Unit, in the southeast flank sector of La Gloria field, just north of the Brooks County line, in Jim Wells County, opened a new oil pay zone for that sector of the field. Drilled to a total depth of 7,800 ft., this well flowed a potential gage of 92 bbl. of oil per day through a ½-in. choke, 40°-gravity oil, with gas-oil ratio 785, no water in the flow. Tubing pressure was 650 psi., casing sealed. Production is through perforations at 7,302-10 ft. This well also showed oil in the regular 7,200-ft. "Church zone" sand.

Two wildcat tests in western Nueces County, near the town of Agua Dulce, are preparing to run production tests above the 6,000-ft. level. Pan American Production Co. and Jack Little, Tr. 1 Loruth Smith Rivers, located in Section 26, Richard King Farm Lots, about 2½ miles south of Richard King field and 3½ miles west of Agua Dulce field, in the R. Garcia Grant, was preparing to test through perforations at 5,533-39 ft. The other test, Skelly Oil Co. 1 W. C. Rivers, in the northeast corner of Lot 6, Section 26, Benton Pasture Subdivision, 1½ miles west of the Agua Dulce field and about 2 miles southeast of Pan American test, was preparing to test at the 6,000-ft. level after running three squeeze jobs at 5,992-96 ft. and 6,004-08 ft. Total depth is 7,358 ft., with 5½-in. pipe set at 6,066 ft. for the completion attempt.

There were 25 new locations reported for the Southwest Texas district this week with 4 being wildcats, 1 each in Duval, Hidalgo, Milam, and Starr counties. Seeligson and Charlotte fields received the greatest amount of new activity with four new starts each. Two new oil pays were opened. Magnolia Petroleum Co. completed a new oil pay opener in La Gloria pool, Jim Wells, while Atlantic Refining Co. completed a new oil pay for North Minnie Bock pool, Nueces County. There were eight dry wildcats, four in Duval and one each in Bexar, Nueces, Starr, and Webb counties. Total completions 26, 11 oil, 2 condensate, 1 gas and 12 dry.

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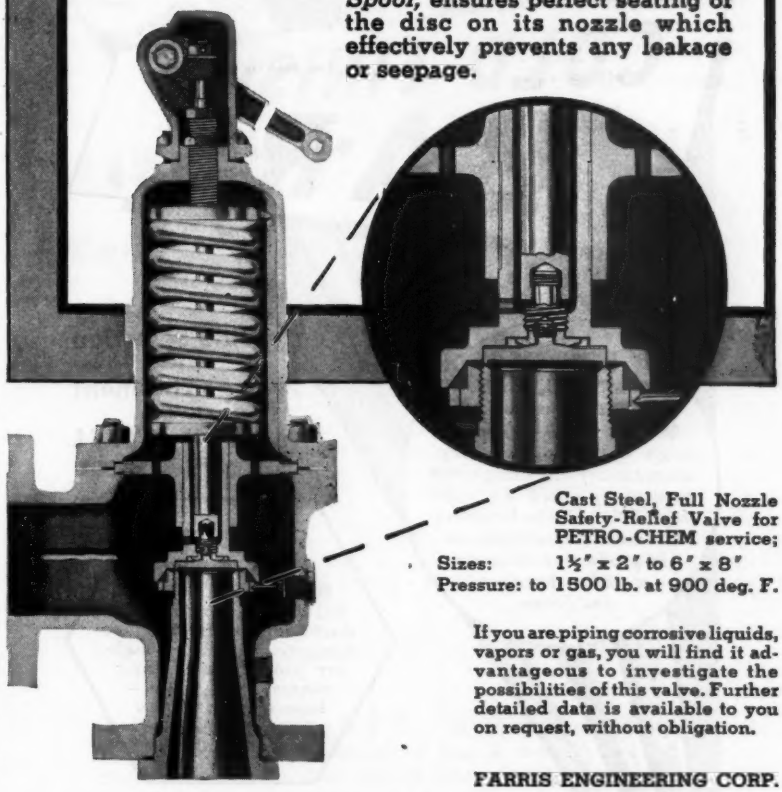

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SOUTHWEST TEXAS SUCCESSFUL WILDCATS

Jim Wells County: New oil pay, LaGloria pool—Magnolia Pet. Co. 1-A El Contesto unit, in Los Olmos and Loma Blanca Grant, top pay 7,300 ft., TD 7,800 ft., perf. 7,302-10 ft., IP 92 bbl. oil per day through a ⅛-in. choke, gas-oil ratio 785, TP 650 lb., csg. sealed, gravity 40°, no water.

Nueces County: New oil pay, North Minnie Bock pool—Atlantic Refg. Co. 1 Mrs. J. R. Parr, Joaquin Lopez de Herrera Grant, Sec. 46, Geo. H. Paul's Subd. of Driscoll Ranch, TD 10,031 ft., perf. 7,680-89 ft., IP 30 bbl. oil per day through 3/16-in. choke, gas-oil ratio 50,000, TP 1,950 lb., csg. sealed, gravity 50°, no water.

Starr County: New gas-condensate pool—Dee Davenport 1 Davenport-State, Sur. 974, 13 mi. NW of Sullivan City, and 1½ mi. N of Frost field, TD 5,501 ft., perf. 4,098-4,112 ft., IP 600,000 cu. ft. gas per day and 6.2 bbl. per day condensate through 9/64-in. choke, gas-oil ratio 100,000, TP 1,365 lb., SIP 1,650 lb., gravity 58°, no water. (Republished to show gage).

SOUTHWEST TEXAS WILDCAT FAILURES

Bexar County: Mellie Pegg and Milton Pegg and W. H. Bode 1 H. and E. A. Lowe, in John H. Pickens Sur. 7, 4 mi. NE of Lytle, dry, TD 985 ft.

Duval County: Bridwell Oil Co. 1 A. G. Villareal, San Andres Grant, 2 mi. E of N end of Benavides field and 3 mi. SE of Benavides, dry, TD 5,141 ft.

J. W. Gorman 2 Farmer's Life Ins. Co., E. R. Gray Sur. 558, 10 mi. NE of Freer, dry, TD 3,466 ft.

H. H. Howell 1 Othelia Barton, Seale & Morris Sur. 427, 1 mi. E of Benavides, dry, TD 5,119 ft.

Ralph and Dale Rowden 1 John P. Akin et al, GB&CNG Sur. 186, 11 mi. SW of Freer, dry, TD 3,242 ft.

Nueces County: Rand Morgan 1-A Rand Morgan fee, Sec. 7, Ragland Farm trs. in Casa Blanca Grant, in North King area, 1 mi. SW of Jack Little, Tr., 1 Rieber gas discovery well at "North King" field, dry, TD 5,780 ft.

Starr County: Continental Oil Co. 3 Dee Davenport, in Sur. 532, 2 mi. E of Rincon field, dry, TD 5,753 ft.

Webb County: Daubert & Achning 1 J. G. Garcia Hrs., Sur. 463, 2 mi. S of Mirando City, dry, TD 1,592 ft.

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MICHIGAN

Interest High in Coming Auction State-Owned Land

SAGINAW. — With oil men optimistic about wildcatting prospects in Oceana and Newaygo counties, interest is high in what is planned as the biggest auction of oil and gas rights on state-owned land in Michigan since 1944. The sale is planned for May 1-2, if the State Conservation Commission is agreeable at its April 15 meeting.

About 50,000 acres are to be offered, all classed as wildcat, some of it in Newaygo and Oceana. The recent crude-oil price boost also is a factor in the heightened interest.

Contributing to the attention being paid the Oceana County area was the completion by Carter Oil Co. of 1 John F. Miller, wildcat in Section 11 of Claybanks Township. Pinched, the well flowed at an initial daily rate of 363 bbl. from Traverse limestone at 1,720 ft. The hole was plugged back, after penetrating Dundee to 2,096 ft.

Of eight Michigan completions in the past week, three were producers, the wildcat and two small wells in Allegan County.

Six new locations were announced, two in Newaygo County, Garfield Township, one each in Barry, Bay, Isabella, and Montcalm counties.

MICHIGAN WILDCAT PRODUCER

Oceana County, Claybanks Township: Carter Oil Co. 1 John F. Miller, NE NW SW 11-13n-18w, flowed 363 bbl., pinched, after acid, from Traverse limestone, TD 2,096 ft., plugged back to 1,720 ft.

MICHIGAN WILDCAT FAILURE

Barry County, Barry Township: R. B. Tamblyn Development Co. 1 G. F. Blackman, N¼ SW NE 6-1n-9w, dry, TD 2,321 ft.

LA.-ARK.

Testing Continued at Shallow Wildcat

SHREVEPORT.—C. L. Wickcliffe 1 Ward, shallow test 9 miles northwest of Prescott, in the W½ NW NW 33-9s-23w, Hempstead County, Arkansas, was still trying to make a well at total depth of 1,798 ft. in the Eagle Mills sand. Last week a pump was installed to test sand at 1,763-71 ft., but recovered fresh water with only a show of oil. A 4-in. liner was run to bottom, perforated 60 ft. off bottom, and swabbed dry with no shows. Operators continued testing at last report.

E. A. Gabriel et al 1 Martindale, NW NW 32-14s-28w, had total depth at 5,420 ft. in the Cotton Valley, ran electric log and took side-wall cores but recovered no shows. Tops released were Tokio 1,610 ft., Paluxy 2,395 ft., upper Glen Rose 3,135 ft., Travis Peak 4,002 ft., and top of the Cotton Valley at 5,000 ft.

In Union County, 2½ miles south of the Woodley field, McAlester Fuel Co. 1-A Patterson, SE SW 19-18s-14w, plugged back to 2,852 ft. from 7,302 ft. in the Smackover. A drill-stem test of perforations at 2,836-48 ft. recovered 2,000 ft. of salt water; a second test at 2,492-2,504 ft. recovered approximately the same amount of salt water. Base of the Saratoga is 2,336 ft., base Annona 2,487 ft., and the Tuscaloosa top 2,900 ft.

In Bienville Parish, Louisiana, Lion Chemical Corp. 1 Ozley, SW NE 13-17n-6w, was fighting a possible blowout between the 5½ and 7-in. casing. The 5½-in. was run to 10,739 ft. but operators could not establish circulation and left 1,800 ft. of cement inside the casing.

NORTH LOUISIANA WILDCAT FAILURES

DeSoto Parish: T. H. McKinney 1 A. P. Garland, SE NW SE 7-14n-14w, dry, TD 4,205 ft., base anhydrite 1,960 ft., base Austin 2,800 ft., broken sand 3,905-25 ft., Paluxy top, by samples, 3,040 ft.

Sabine Parish: R. W. Norton, Jr., et al 1 D. C. Etheridge, NE SW 12-9n-12w, dry, TD 6,006 ft., massive anhydrite 5,511-5,603 ft., elevation 319 ft.

Winn Parish: B. E. Reid et al 1 O. M. McCartney, 26-10n-1w, dry, TD 1,537 ft.

ARKANSAS WILDCAT FAILURE

Arkansas County: Ryan Consolidated Oil Co. 1 Roy McCollum, NW NW NW 24-2s-5w, dry, TD 3,731 ft., electric log tops: Midway 2,240 ft., Nacatoch 2,995 ft., broken sand 2,995-3,150 ft., porous sand 3,492-3,530 ft., Paleozoics 3,530 ft., elevation 215 ft.

SOUTH LOUISIANA

Discovery Flows 47 Bbl. In 18-Hour Gage

NEW ORLEANS. — Magnolia Petroleum Co. 1-C Lutcher, discovery in the northeast Mud Lake area, 24-14s-11w, 4 miles northeast of Mud Lake gas-condensate field, 1½ miles southwest of shoreline of Calcasieu Lake, has been completed for an 18-hour gage of 47 bbl. of 43°-gravity condensate, with 3,716,000 cu. ft. of gas with 4,347 psi. pressure, flowing through a 12/64-in. choke. Gas ratio is 79,487 and total depth is 11,705 ft. Production is through 293 perforations at 10,762-832 ft.

Humble Oil & Refining Co. 1 Anderson-Post Hardwood Lumber Co. et al, deep wildcat test of the Hawthorne area in Vernon Parish, 11-2n-11w, 22 miles north of Neale field production, has set protection pipe. Total depth is 9,822 ft. and 9⅝-in. protection pipe is at 9,787 ft. The test is projected to 12,000 ft.

Sohio Petroleum Co. 1 Placid Trahan, wildcat test in the Leleux area of Vermilion Parish, 33-11s-1e, off the southwest side of the old Gueydan prospect, and 4½ miles east of Gueydan field production, is at a total depth of 9,230 ft. and is running 7-in. protection pipe. This test is projected to 11,000 ft.

The 10 new locations reported this week for South Louisiana were in proven areas. The 10 completions included 6 oil, 1 condensate, and 3 dry holes. The three dry wildcats are two in St. Mary and one in St. Bernard parishes.

SOUTH LOUISIANA WILDCAT FAILURES

St. Bernard Parish: The California Co. 2 Biloxi Marsh Lands, in Biloxi Bayou, 25-12s-16e, in Point Aux Marchettes area, dry, TD 9,600 ft.

St. Mary Parish: Humble 1 Rose Phillips Feitel et al, 12-18s-11e, in Shell Island area, 6 mi. SW of Deer Island production, dry, TD 11,920 ft.

St. Mary Parish: Humble 1 State-Hogg Bayou, Lse. 732, in Atchafalaya Bay, Twp. 18s-10e, dry, TD 13,423 ft.

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Zublin HORIZONTAL WELL DRILLING

EASTERN TEXAS

New Travis Peak Production Discovered

DALLAS.—New Travis Peak sand production was discovered last week on the East Texas border at Arkansas Fuel Oil Co. and Southern Production Co. 1 M. C. McCauley, in the P. Dougherty Survey, about 3 miles east of Scottsville, Harrison County. Full details had not been released, but a drill-stem test at 6,441-53 ft. recovered 1,170 ft. of clean oil, through ¼-in. chokes, in 45 minutes. Operators were coring ahead to determine the extent of the pay zone. Nearest Travis Peak production is 5 miles to the east and south, on the west side of Waskom. Location is 2 miles east of a Travis Peak failure at Rogers Lacy 1 Verhalen, which found that zone around 6,500 ft., on an elevation of 415 ft. Elevation on the 1 McCauley is 325 ft. but top on the Travis Peak was not released.

Other Travis Peak exploration work includes a reported operation by Gulf Oil Corp. in or adjoining the Sarah Reynolds Survey, some 4 miles north and east of Waskom. Definite details have not been released, but it is understood that among majors holding acreage in that vicinity are Continental Oil Co., Phillips Petroleum Corp., and Humble Oil & Refining Co. The Texas Co. was reported securing acreage for a Travis Peak test, south of Henderson, in Rusk County. Location was not reported but it was considered likely to be on the Estell Madden tract, Thomas Williams Survey, south of Mount Enterprise.

In Cherokee County, 5 miles northeast of Gallatin, Delta Drilling Co. 1 Frances Lester had total depth at 8,761 ft. in limestone. Sample tops placed the James at 8,550 ft., Pettit 8,710 ft., Pettit oolitic 8,750 ft., made up of brownish gray crystalline, dense to sugary, and ranging from nonporous to slightly porous. There was a light brown gas or distillate stain in some fragments. In Freestone County, The Texas Co. 1 W. M. White was drilling below 13,850 ft. in limestone, after being delayed by junk in the hole.

EAST TEXAS WILDCAT FAILURE

Cass County: W. A. Patterson 1 J. C. Turner, Soloman Hines Sur., 1½ mi. W Avinger, dry, TD 3,212 ft.

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APPALACHIAN FIELD

Wildcat Operations Attracting Attention

PITTSBURGH.—In Wolf Creek district, Monroe County, West Virginia, Godfrey L. Cabot, Inc., has made a location for an important wildcat on Margaret S. Twohig tract which is the first test in this county which forms the southeastern tip of the state. On the Alderson Quad, it is located 2½ miles south Latitude 37 degrees 40 minutes and approximately 2½ miles west Longitude 80 degrees 35 minutes, and starts at an elevation of 1,715.47 ft. The Appalachian Frontier is under closer study as the needs for additional gas reserves was indicated by the acute shortages for industrial plants during the past winter and since the rugged folded country in the eastern parts of the state gives promise with the good performance of the two gas wells on the Blackwater anticline near Davis in Tucker County. A test which showed some gas in the Oriskany sand and which is now drilling down to the Clinton sand will test a major structure in Williamsburg district, Greenbrier County. In Greenbrier district, Summers County, just west of Monroe County, another wildcat is now drilling below 4,000 ft. about 2,000 ft. below the base of the Big Lime. To the north in Portland district, Preston County, a test is drilling to the Oriskany in the new pool indicated by a good Onondaga chert completion which is feeding a good volume in the line.

In Elk district, Kanawha County, United Fuel Gas Co. completed 5,769 J. E. Carpenter good for 9,549,000 cu. ft. gas with the surface elevation 1,158 ft., Corniferous lime 5,267 ft., Oriskany 5,390-5,420 ft., gas 5,401-08 ft., shot 5,390-5,420 ft., rock pressure 640 psi. 14 hours, total depth 5,420 ft. The rock pressures are lower in this extension to the Oriskany field to the north and west.

In Baileysville district, Wyoming County, Hope Natural Gas Co. completed another well, the 9,084 Altizer-New River & Pocahontas Consolidated Coal Co., with a gage of 2,631,000 cu. ft. with the Ravencliff sand logged at 1,425-1,519 ft., 62,000 cu. ft. gas at 1,475 ft., Maxton sand 2,267 ft., 220,000 cu. ft. gas at 2,319 ft., Big Lime 2,528 ft., Berea 3,609-37 ft., gas 3,617-27 ft., rock pressure 600 psi. 24 hours, total depth 3,639 ft.

New locations totaled 25, located in Sherman district, Calhoun County; Falls district, Fayette County; Poca district, Kanawha County; Sheridan district, Lincoln County; Union district, Marion County; Kermit district, Mingo County; Wolf Creek district, Monroe County; Jefferson district, Nicholas County; Curry district, Putnam County; Booths Creek district, Taylor County; Grant, Lincoln and Stonewall districts, Wayne County; Reedy and Spring Creek districts, Wirt County; Clear Fork and Oceana districts, Wyoming County.

In Fayette County on Chestnut Ridge in Georges Township, southwest Pennsylvania, Peoples Natural Gas Co. topped the Onondaga chert at 7,089 ft. in the test on W. M. Hartman farm and set casing at 7,117 ft. From a surface elevation of 2,354 ft., the

chert is placed at minus 4,735 ft. within production possibilities. Here, Manufacturers Light & Heat Co. had a gas pocket blowout in the promising test on Jesse S. Eutsey which blew the tools up the hole from below the Tully lime to about 100 ft. off bottom.

In Summit Township, Erie County, Sylvania Corp. topped the Tully Lime at 1,768 ft. in the test on Frank Buczkowsky farm.

New locations totaled three, located in Morgan and Washington townships, Greene County; Washington Township, Indiana County.

CANADIAN FIELDS

Imperial Trying for Second Leduc Producer

CHATHAM.—With Imperial-Leduc 1, discovery well southeast of Edmonton, definitely in production but shut in part time for lack of storage, three other Imperial tests are drilling. Imperial-Leduc 2, LSD 1, 16-20-26w4, drilling below 4,500 ft., is within a few hundred feet of the potential producing horizon in the Devonian limestone. Imperial-Leduc 3, LSD 10, 26-50-26w4, is drilling below 2,900 ft. and Imperial-Leduc 4, LSD 16, 15-50-26w4, has spudded.

Areas outlying the Leduc field are also receiving attention. About 40 miles southwest, Imperial-Battle Lake 1 has location near Winfield in LSD 16, 12-46-3w5. The Millet area between Leduc and Wetaskiwin, in the vicinity of Township 47-24w4, will likely be treated this spring by McColl-Frontenac Oil Co. Interests associated with the same company have secured 199,687 acres west of Leduc and close to the Imperial holdings. This acreage is in townships 49, 50 and 53-27w4, townships 49 to 53-28w4, townships 49 to 53-1w5, townships 48 to 53-2w5, and townships 49, 50 and 53-3w5

Wabamun.—In the Wabamun area, 40 miles west of Edmonton, structure testing has started for Anglo-Canadian Oils of Calgary. The company has some 175,000 acres under reservation. The same company will start drilling this month in the Beaver Hill Lake area, near Viking, where a wildcat test last year encountered gas showings in the first 3,000 ft.

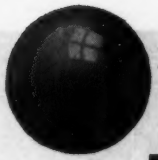
Foremost.—In the Foremost field, southern Alberta, McColl-Union 6-4-5-10, LSD 6, 4-5-10w4, drilled below the Bow Island sand to 2,307 ft., found water in that formation and is abandoning. McColl-Union 10-B-23-6-10, LSD 10, 23-6-10w4, is nearing completion.

Hanna.—In the Hanna district, south-central Alberta, Berry Creek Petroleums 1, LSD 3, 9-31-14w4, suspended drilling at 4,289 ft. after encountering a substantial gas showing. Production tests are in progress.

Lloydminster.—In the Alberta section of the Lloydminster field, Blackfoot 1, LSD 7, 18-50-1w4, 2 miles north and 6 miles west of Lloydminster, encountered production at a record shallow depth of 1,772 ft., oil rising 880 ft. with sufficient gas pressure to form a sand bridge. Bailing operations indicate a good producer. Production is from the Colony sand, overlying the Sparky sand at around 1,900 ft. and proving a third oil sand in this section of the field. The lowest sand, as yet unnamed, is slightly below 2,000 ft. A number of earlier wells in the main field shut off the Colony sand to reach the lower horizons, and may now perforate to test the Colony.

In the Saskatchewan end of the field, Highwood-Lloydminster 1, SW LSD 11, 13-48-28w3, has been finished at 1,880 ft. with lower Cretaceous at 1,698 ft., Sparky oil sand at 1,861 ft. and is testing. Manitou 1, NW LSD 6, 31-48-27w3, has finished at 1,870 ft. with lower Cretaceous at 1,704 and Sparky sand at 1,858 ft.

Following completion of Superior-Ponalta



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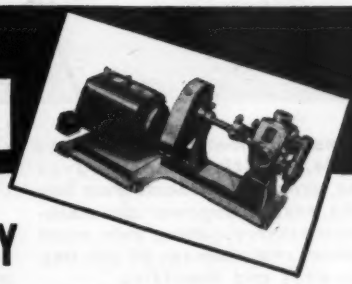

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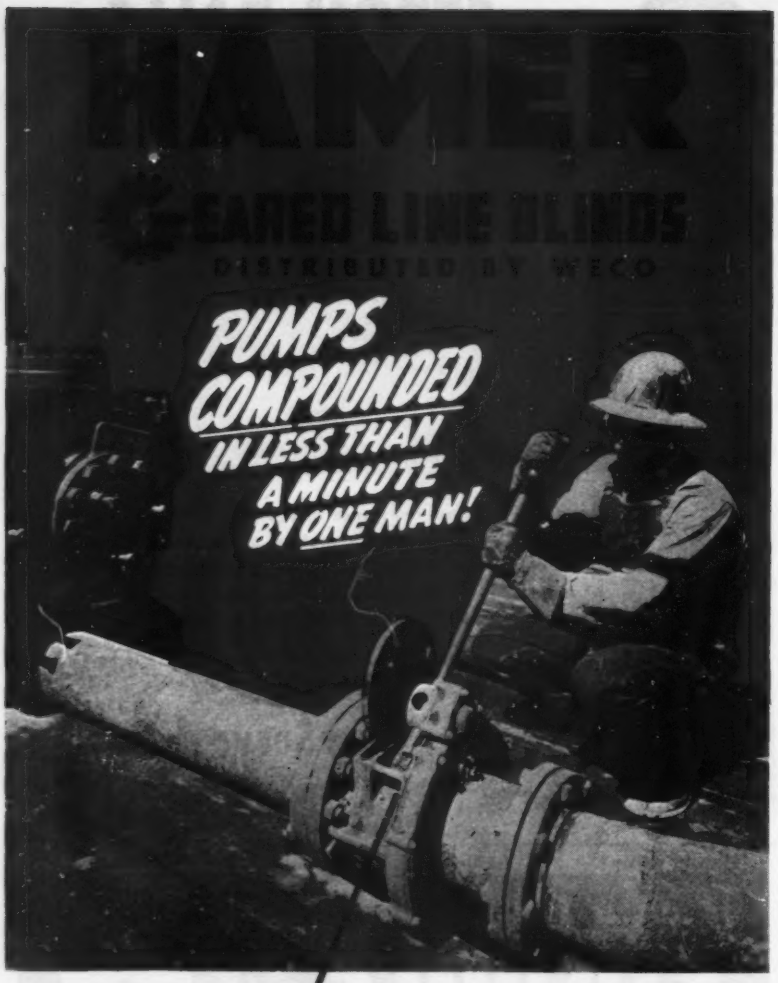

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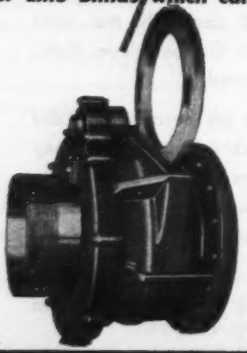

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1 in the Blackfoot area west of Lloydminster as a large producer, Superior Oils and General Petroleums of Calgary will drill a series of seven joint tests in the general area. Locations have been spotted for Superior 2 in NW LSD 4, 14-50-2w4, and Superior 3 in SW LSD 3, 14-50-2w4.

Tar Sands.—The Alberta provincial government is granting an additional $100,000 for construction of a plant for dehydrating and refining oil at Bitumont, on the Athabaska, below Fort McMurray. The advance is being made under an agreement with Oil Sands, Ltd., and Bitumont Holding Co. Previous advances made by Alberta from the post-war reconstruction fund for the Oil Sands plant development total $400,000.

ROCKY MOUNTAIN

Northwest Fault Block Test For Elk Basin Fold

DENVER.—A wildcat which is going to be closely watched during the next few months is Sinclair-Wyoming Oil Co. 1 Wilkins, NW SW NW 28-9s-23e, Carbon County, Montana, on the northwest flank of the Elk Basin field. The Elk Basin structure anticline swings sharply to the northwest north of the Wyoming-Montana boundary, and the Wilkins well is located on the apex of the general fold. However, it is separated from the field proper by several faults, and farther to the northwest is another fault which closes the block in that direction.

Big water flow.—Stanolind Oil & Gas Co. 3-M Terry, NW SW SW 19-2s-2e, Hudson field, Fremont County, Wyoming, a test to the Madison, unloaded at 1,866 ft., and flowed estimated 80,000 bbl. of water from the lower Tensleep, doing considerable damage. It was killed with 14-lb. mud, and plug was set with 7-in. at 1,839 ft.

Rangely outposts.—Stanolind Oil & Gas Co. 1 Pepper, SW SE NW 31-2n-101w, an outpost on east side of Rangely field, swabbed 128 bbl. of oil in 40 hours, then swabbed 22 bbl. in 15 hours from 6,000 ft. It had the top of the Weber at 6,075 ft., salt water at 6,377 ft., total depth, and plugged back to 6,299 ft. Pump is being installed. Delta Drilling Co. 1 Kenney, SW NW SW 34-2n-101w, 2½ miles farther east, was reported to have had 3 ft. of saturation in the Morrison sand, topped at 4,420 ft., but this lacks confirmation.

Red Mesa test drilling deeper.—Hudson-Coryell 1 Schmitt, C NW NE 36-34n-12w, Red Mesa district, La Plata County, Colorado, which a few weeks ago was reported a discovery, estimated at 50 to 100 bbl. per day, from the Dakota sand, is drilling deeper at 3,341 ft. to explore the Lakota sand of the Dakota series before testing. Old total depth was 3,320 ft., top of Dakota, 3,295 ft. The 7-in. was set at 3,057 ft. and 5-in. liner run to 3,310 ft. It was reported to have 1,000 ft. of oil in the hole.

Steamboat Butte extension.—Brinkerhoff Drilling Co.-Sohio Petroleum Co. 1 Tribal, NW NW NW 9-3n-1w, Steamboat Butte field, Fremont County, Wyoming, an outpost a mile southeast of nearest producer, kicked off when swabbed and flowed by heads at the rate of 170 bbl. per day from the Tensleep. It will be put on the pump. Total depth is 6,923 ft., approximately 95 ft. in the sand. It also had saturation in several upper sands.

New operations.—New operations reported, four in the Rangely field in Colorado, one each in Ant Hills, South Elk Basin, Big Muddy and Lamb fields, two in Hamilton field, and one wildcat in Wyoming. The wildcat is British-American Oil Producing Co. 1 Natrona unit, NE NE SW 27-36n-83w, a 3,500-ft. test to the Frontier on a unitized block of 4,120 acres.

COLORADO WILDCAT FAILURE

Point Lookout, Montezuma County: Jack Harris 1 Government, C NE 22-35n-15w,

TD 954 ft., hole full of water in the Mancos, prep. to abd.

WYOMING WILDCAT FAILURE

Mush Creek, Weston County: Richard G. Martin 1 Government, NE NE NW 34-35n-63w, TD 3,720 ft., Newcastle sand 3,610 ft., hard and tight, plugged and abd.

PERMIAN BASIN

Cities Service Test To Resume Drilling

MIDLAND.—Latest report on Cities Service Oil Co.'s Crockett County Wolfcamp discovery was that tools had been recovered and the hole was being conditioned to drill ahead. The test, 1-B J. W. Owen, Section 6, Block GG, in the H&OB Survey, 1½ miles south of the Olson field, lost the tools when the well was killed after it had blown out, with a spray of oil and water. Gas was estimated at 15,000,000 cu. ft. Total depth was 5,802 ft. at the time of the blowout, but the oil was thought to be coming from around 5,600-70 ft.

In southwestern Concho County, east of the Permian Basin, B. A. Duffy 1 Robert Wilson, 12 miles southwest of Eden, in the H&TC Survey, had prospects of opening another Pennsylvanian limestone field. On an 8¼-hour test, the well averaged 5.7 bbl. of fluid an hour, cutting about 25 per cent acid residue, sediment and fresh water load. The oil was from the crinoidal zone of the Strawn formation at 3,682-3,850 ft. Operators planned to reacidize. This test was originally drilled in 1943, to a total depth of 3,897 ft., where it encountered salt water. Plug-back depth now is 3,850 ft. When first drilled, the well was shot with nitroglycerine, and was said to have pumped 23 bbl. of 45°-gravity oil a day.

Sun Oil Co.'s second Strawn producer in the new Jameson field of northwestern Coke County tested 8.13 bbl. of oil in 45 minutes, flowing through ½-in. bottom-hole choke and ¼-in. top choke, from perforations in the Strawn at 6,165-6,230 ft. When opened, the well had gas to the surface in 26 minutes, drilling mud in 3½ hours, and following that started flowing oil. It was allowed to flow into pits to clean itself before being turned into tanks. Operators shut it in after 6 hours to test another section of the Strawn. This well had indicated nearly 250 ft. of broken pay zone.

In Reeves County, 13 miles northeast of Balmorhea, Argo Oil Corp. has resumed testing of its 1 Dora Roberts, Section 294, Block 13, H&GN Survey, which has shown for a producer in the lower Permian. Total depth was 14,073 ft., plugged back to 11,990 ft. When reopened, it flowed by heads, and was swabbed, for a total recovery of 64 bbl. of oil and 40 bbl. of water in 1½ hours. The flow died at that time. Shut in for 2 days, it again headed and was swabbed for the same amount of oil in 1 hour, before it died. Further tests recovered 64 bbl. of oil and 55 bbl. of water; 48½ bbl. of oil and 51 bbl. of water; 48 bbl. of oil and 62 bbl. of water, and the last test recovered only 1 bbl. of oil plus 38 bbl. of water. Each test was exactly 1 hour, at which time the well promptly died.

Gulf Oil Corp. 1-A University-Fogelson, Ellenburger discovery in the Jordan field of Ector County, was completed for a potential of 223 bbl. of oil and 57 bbl. of sulfur water in 24 hours, flowing through 3/16-in. choke on 2-in. tubing set at 8,951 ft. Total depth was 8,985 ft. in dolomite, plugged back to 8,965 ft., with top of the pay at 8,914 ft. Gravity of the oil was 42.7° and gas-oil ratio was 650:1. In the Foster field, Ector County, Birdwell & Mabee 2 John Kelly flowed 1,020 bbl. of oil in 4 hours and was given a completion potential of 6,120 bbl. of oil a day. Flow was through open tubing, from limestone pay topped at 4,312 ft.

New locations for West Texas last week totaled 23, down from the previous week's 44. Total new wells for the year were 393 field wells and 22 wildcats, or an average of around 35 per week.

WEST TEXAS WILDCAT FAILURE

Andrews County: Ventura Oil Co. 1 Frank Williamson, Sec. 15, Blk. A-26, PSL Sur., 1 mi. E Union field, dry, TD 8,545 ft., recovered oil and gas-cut mud 6,850-7,260 and 7,240-7,430 ft., Devonian 8,340 ft., elevation 3,384 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—In Chaves County, Richfield Oil Corp. 1 White, NW SE 6-13s-29e, was drilling below 2,685 ft., after finding a slight show of oil and gas. A drill-stem test at 2,476-2,680 ft., open 1 hour, produced a slight blow in 1 minute, increasing to a good blow, then decreasing after 25 minutes. Total recovery was 2,380 ft. of water having a trace of oil. There was a good stain and porosity at 2,525-2,630 ft. With packer set at 2,465 ft., it swabbed 100 bbl. of drilling water. Top of the San Andres was reported at 1,870 ft.

Completions for the week included another large oil well in the Skaggs area of southeastern Lea County. Continental Oil Co. et al 5-B-23 Skaggs, approximately SW NE 23-20s-37e, was given a daily potential of 4,944 bbl. of oil, on the basis of a 3-hour test through 1-in. choke on tubing. Total depth was 10,231 ft., in the Pre-Cambrian, plugged back to 7,727 ft., in the Strawn pay, topped at 7,710 ft., on an elevation of 3,539 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Chaves County: Kerr-McGee Oil Co. 1 Bush Reid, SW NW 8-13s-30e, dry, TD 2,969 ft., sand 530-1,105 ft., Yates 1,160 ft., San Andres 2,520 ft., some oil with water at 2,950-76 ft.

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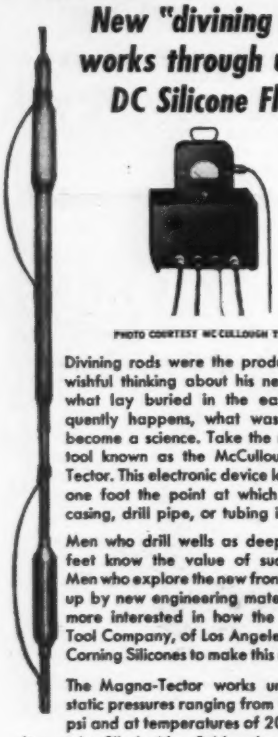

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OKLAHOMA

Kingwood Oil Co. Revives Interest in Ceres Area

ONE AND THREE-QUARTERS miles southwest of the Ceres pool discovery well in Noble County, Kingwood Oil Co. 1 Bolay, SW SW NW 35-23n-1w, recovered 660 ft. of oil and distillate and 360 ft. of oil and gas-cut mud, in 12 minutes, on a drill stem test at 4,444-69 ft. A second drill-stem test at 4,471-83 ft., open 12 minutes, showed gas in 3 minutes and recovered 800 ft. of 41°-gravity oil, and 120 ft. of oil-cut mud. The Bartlesville was logged at 4,466 ft. Saturation was cored at 4,483 ft., total depth. Operators are running casing.

Deering, Inc., 1 Howard, NW NW 15-5n-2w, McClain County, has 7-in. set at 7,150 ft. A drill-stem test at 7,061-71 ft. recovered 240 ft. of oil-cut mud with free 40°-gravity oil on top. A second test near 7,195 ft., the total depth, recovered 20 ft. of oil and gas-cut mud and 90 ft. of oil. Woodford was logged at 7,110 ft., Misener at 7,148 ft., and Hunton at 7,152 ft.

Ohio Oil Co. 1 Woods, NE SW NE 17-3n-5w, Grady County, flowed 808 bbl. of oil in 24 hours from the Dornick Hills sand, giving the old Knox pool a new producing zone. The hole was drilled to 3,940 ft. and 7-in. was set at 3,717 ft. Pipe was perforated at 3,492-3,512 ft., and at 3,564-92 ft. After running swab five times, the well started to flow and made 33 bbl. of 42°-gravity oil the first hour, and 35 bbl. the second hour. The old Knox pool produces 35°-gravity oil from the Pontotoc at about 1,700 ft.

Max Pray and R. L. Bauman are drilling out cement from casing set at 10,157 ft. in their 1 Myers, NW NW 7-4n-3w, Garvin County, 1 mile southwest of the same operators' Hunton discovery in NE NE 1-4s-4w. One-half mile east of the Myers, their 1 Frankenburg is drilling below 9,676 ft., running consistently higher than the discovery well in 1-4s-4w, being 300 ft. higher on the top of the Bromide, logged at 9,600 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Major County: R. Olsen Oil Co. 1 Lewis Ott, C W/2 SW SE 2-21n-9w, flowed 44 bbl. of distillate from 2nd Wilcox at 8,005-8,124 ft. through 28/68-in. choke; Pawhuska 3,875 ft., Upper Layton 5,170 ft., Lower Layton 5,680 ft., lime 6,250 ft., Oswego 6,300 ft., Oolitic sand 6,755-90 ft., Mississippian 6,990 ft., Kinderhook 7,560 ft., Woodford 7,610 ft., Hunton 7,650 ft., Sylvan 7,666 ft., sandy dolomite 7,763 ft., Viola 7,785 ft., dense 7,831 ft., 1st Wilcox 7,923 ft., TD 8,124 ft.

Okfuskee County: J. E. Crosbie 1 Schultz, SE NE SW 30-12n-7e, new pay discovery in Southwest Paden field, flowed 75 bbl. of 36°-gravity oil from Earlsboro at 3,348-64 ft. through ¾-in. tubing choke; Hogshooter 1,600 ft., Checkerboard 1,960 ft., Wewoka 2,590 ft., Prue 2,937 ft., TD 3,364 ft.

OKLAHOMA WILDCAT FAILURES

Carter County: Roy M. Johnson 1 Sykes, NE SE NW 2-4s-2w, dry, TD 1,101 ft., sand 604-18 ft. and 623-39 ft., shaly sand 795-837 ft., sand 1,085-1,100 ft .

Choctaw County: Cargill Brothers 1-A Callay, SE SE SW 23-7s-15e, dry, TD 626 ft., lime 602 ft.

J. L. Cargill 1 Murray, NW NE NW 35-7s-15e, dry, TD 642 ft., shale 105-642 ft.

Cimarron County: The Ohio Oil Co. 1 State "B," SW NE NW 33-6n-2ecm, dry, TD 6,503 ft., Cimarron anhydrite 2,055 ft., sand 3,600 ft. with a small show of gas, lime 4,176-80 ft., Granite Wash 4,180-82 ft., Mississippi lime 5,460 ft., Arbuckle 5,930 ft., granite 6,494 ft.

Cleveland County: Dearing, Inc. 1 Rookstool Estate, C NW NW 10-9n-1e, dry TD 6,455 ft., Tonkawa 3,527 ft., Belle City 3,937 ft., Checkerboard 4,477 ft., Oswego 5,450 ft., Hunton chert 5,797 ft., Hunton 5,804 ft., Sylvan 6,068 ft., Viola 6,172 ft., brown dense 6,364 ft., 2nd Wilcox 6,430 ft.

Cotton County: L. H. Choate 1 Wilson, SW SW NE 34-3s-10w, dry, TD 1,612 ft., no tops reported.

E. P. Griffin 2 Scruggs, SE SE NW 21-4s-11w, dry, TD 1,234 ft., sand 1,231-34 ft.

Taylor et al 1 Park, NW NW NE 23-4s-11w, dry, TD 1,609 ft., no tops reported.

George Proctor et al 1 Hern, NW NW SE 24-4s-11w, dry, TD 2,133 ft., no tops reported.

Morgan Brown 1 Rose, SE SE NE 25-4s-11w, dry, TD 1,610 ft., no tops reported.

R. E. Barbre et al 1 Goode, NE NE NW 28-4s-11w, dry, TD 1,585 ft., no tops reported.

R. W. Steimaker 1 Scruggs, SE SW SW 18-4s-10w, dry, TD 1,812 ft., Megargel 1,800 ft.

Garvin County: R. H. Dearing & Son 1 L. L. Hope, NE NW SE 32-4n-2w, dry, TD 7,000 ft., Tonkawa 4,825 ft., sand 6,236-40 ft., Viola 6,253 ft., Bromide dense 6,630 ft., sandy dolomite 6,810 ft.

Jefferson County: Ryan Consolidated 1-A Seay, NW SW NE 5-7s-5w, dry, TD 3,012 ft., Granite Wash 2,978-3,012 ft.

Love County: Seitz & Seitz 1 Whitmore, SE SE SW 7-6s-2e, dry, TD 2,254 ft., sand 2,030-42 ft. with a stain of oil, 2,050-57 ft. with stain of oil and 2,092-2,104 ft. with a stain of oil, Detrital dense 2,140 ft., lime 2,254 ft.

Pawnee County: Mohawk Drilling Co. 1 Gilbert, SW SW NE 20-22n-3e, dry, TD 4,411 ft., Upper Layton 2,945 ft., Lower Layton 3,070 ft., Oswego 3,585 ft., Mississippian 4,060 ft., Woodford 4,315 ft., Misener 4,342 ft., Simpson 4,345 ft., 1st Wilcox 4,360 ft., 2nd Wilcox 4,378-4,403 ft., shale 4,403-11 ft.

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OHIO, KENTUCKY

Important Medina Gas Strike In Morgan County

COLUMBUS.—An important Medina sand discovery was made in western York Township, Morgan County, by the Ohio Fuel. The 2 Dora Jadwin in Section 26 was dry in the Clinton and was drilled deeper to 4 ft. into the Medina sand, where it gauged 713,000 cu. ft. The discovery is between the Bearfield pool and the Medina sand pools in Muskingum County, and opens a large area of possible production.

The Four Way Oil Co. moved in ⅘ mile southwest of the Sturgeon pool and ⅘ mile north of the Baker pool to find a good show of oil on the M. A. Walser 1, Section 27, Hopewell Township, Perry County. The Clinton came in at 2,885-2,913 ft., and after shot made 80 bbl. in 24 hours.

The discovery of another of the small gas pools in Lorain County was indicated when the Ohio Fuel 1 V. L. Young, Lot 5, Wellington Township, had 1,560,000 cu. ft. at 3 ft. in the sand. The Clinton was topped at 2,336 ft. and a fishing job encountered at 2,339 ft. when the bit was lost in the hole.

Stark County reported four locations and was followed by Perry and Athens counties with three, Muskingum and Licking two, and four scattered. Completions totaled 6 with Canton leading with 8.

OHIO SUCCESSFUL WILDCAT

Morgan County, York Township: Ohio Fuel Gas 2 D. L. Jadwin, Sec. 26, Medina 3,928 ft., 713,000 cu. ft., TD 3,932 ft.

OHIO WILDCAT FAILURE

Lorain County, Carlisle Township: G. B. Harmon 1 A. J. Haist, Sec. 1, no Clinton, TD 2,345 ft.

EASTERN KENTUCKY ACTIVITIES

ASHLAND.—Floyd County was in the big completion news during the week with a Kentucky-West Virginia Gas Co. well, No. 5706 on the Miles Hall property, coming in for 1,100,000 cu. ft. in shale, natural. The well was at 2,511 ft.

Kentucky-West Virginia Gas completed Well No. 5729 on the Martin County Land Co. property, Martin County, at 774 ft., with 133,000 cu. ft. in Salt sand.

The same company brought a dry hole in Well No. 5704 on L. B. Wells property, Johnson County, at 2,204 ft.

WESTERN KENTUCKY

OWENSBORO.—Late reports credit Carter Oil Co. with a 70-bbl. discovery in McClosky at 2,151-58 ft. in their 1 Josephine Johnson, 5-N-23, Webster County. Total depth is 2,731 ft.

Sohio Oil Co. 1 Simon Smith, 14-P-29, Daviess County, located 1½ miles south of Enterprise pool, is a 5-bbl. well in Waltersburg at 1,058-65 ft., total depth 1,071 ft.

Two miles south of the Geneva pool, in Henderson County, Sun Oil Co. is drilling at 2,583 ft. in its 1 J. E. Willett, 25-Q-22, Lower Menard was logged at 1,761 ft., Viola at 1,856 ft., Barlow at 2,232 ft., and Renault at 2,446 ft.

About 2½ miles northwest of the Dixie pool, Carter Oil Co. 1 L. D. Sigler 12-O-22, is drilling at 2,492 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCATS

Daviess County: Sohio Oil Co. 1 Simon Smith, 14-P-29, 5-bbl. pumper, Waltersburg 1,058-65 ft., TD 1,071 ft.

Webster County: Carter Oil Co. 1 Josephine Johnson, 5-N-23, 70 bbl. oil, McClosky 2,151-58 ft., TD 2,731 ft.

WESTERN KENTUCKY WILDCAT FAILURE

Daviess County: Ryan 1 L. R. Waitman Heirs, 6-P-29, dry at 1,824 ft.

INDIANA

EVANSVILLE.—F. A. Calvert, Jr., et al 1 Hastings, SW SW NW 10-8s-14w, Posey County, is testing the McClosky at 2,674-88 ft., 2,694-2,708 ft. and 2,712-16 ft. After treatment with 6,000 gal. of acid, the well swabbed and flowed 8 to 10 bbl. of fluid per hour, 30 per cent water. Lower Kincaid was logged at 1,601 ft., Menard at 1,782 ft., Waltersburg at 1,934 ft., and Barlow at 2,300 ft.

KANSAS

Darby and Bothwell Have Good Prospect in Rush Co.

IN the northwest corner of Rush County, Darby and Bothwell 1 Weitzel, SW SW NW 1-16s-20w, recovered 120 ft. of oil and gas-cut mud and 30 ft. of free oil on a drill-stem test at 3,403-13 ft. Well is drilling below 3,520 ft. to test formations below the Kansas City, which was logged at 3,384 ft. The nearest production is about 4 miles north in the Penny-Wann pool, which produces from the Sooy.

Texas Co. 1 Dreiling "B," NE NE SE 21-13s-17w, Ellis County, has extended the South Catherine pool ½ mile south with a 3,000-bbl. well in the Arbuckle. This is the first maximum well in the new pool, which now has four producers, one dry hole, and one well testing.

Two other pools were extended by maximum potential wells. In Rooks County, Stanolind Oil & Gas 1 Stice, CEL NE SW 27-8s-19w, is a maximum well in the Arbuckle and gives the Webster pool a ¼-mile extension to the northeast. In Ellis County, Midstates Oil Corp. 1 Cross, NW NE SW 2-11s-18w, extends the Northwest Burnett pool nearly ½ mile southeast, and is the seventh maximum well in the pool, which now promises to join up with the Burnett pool, less than 1 mile to the southeast.

Solar Oil Co. 1 Tammen, SW SW SW 24-19s-16w, Rush County, located about 1 mile northeast of the Ryan pool, has pipe set at 3,661 ft., 2 ft. in the Arbuckle, to test saturation found at 3,659-67 ft. Lansing was logged at 3,370 ft.

KANSAS SUCCESSFUL WILDCAT

Butler County: J. M. Huber Corp. 1 Womack, NE NW NE 19-28s-6e, recompletion, produced 2,000,000 cu. ft. gas from Bartlesville at 2,690-97 ft.; Kansas City 2,147 ft., Mississippian 2,773 ft., Arbuckle 3,172 ft., TD 3,191 ft.

KANSAS WILDCAT FAILURES

Ellis County: J. C. Farley 1 Wiesner, SE

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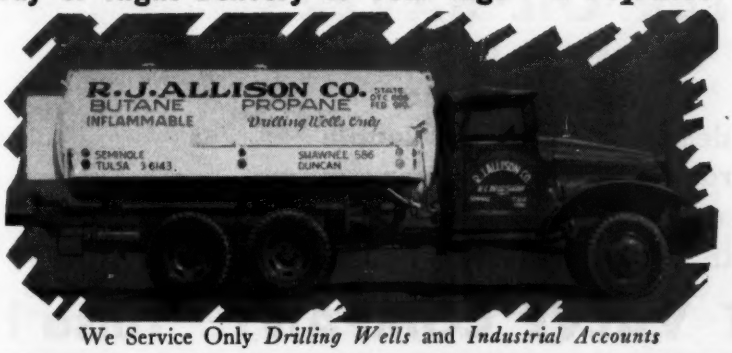

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SE SE 26-13s-20w, dry, TD 3,815 ft., anhydrite 1,501 ft., Topeka 3,196 ft., Heebner 3,441 ft., Lansing 3,504 ft., Basal Kansas City 3,734 ft., Arbuckle 3,800 ft.

Greenwood County: Lee et al 1 Arthur Morton, C S/2 SW SW 2-28s-12e, dry, TD 1,337 ft., Squirrel sand 1,312 ft.

Pratt County: Flynn Oil and Herndon 1 Simon, C N/2 NE NE 32-26s-11w, dry, TD 4,534 ft., Lansing-Kansas City 3,630 ft., Mississippian 4,094 ft., Kinderhook 4,179 ft., Viola 4,291 ft., Simpson 4,379 ft., Arbuckle 4,466 ft.

E. Paul Hatfield 1 Keeler, SE NE NE 7°-28s-12w, dry, TD 4,545 ft., Topeka 3,171 ft., Douglas 3,565 ft., Lansing-Kansas City 3,733 ft., Mississippian 4,185 ft., Kinderhook 4,314 ft., Viola 4,338 ft., Simpson 4,398 ft., Arbuckle 4,492 ft.

MISSISSIPPI

Neshoba County Test Into Lower Cretaceous

JACKSON.—Slick Oil Co. and Plains Production Co. 1 J. D. Breazeale, NW SW SE 28-12n-10e, 9 miles northwest of Philadelphia, Neshoba County, was drilling below 4,181 ft. in red shale. Side-wall cores at 2,668, 2,672, 2,849, 2,919, 2,034 and 3,036 ft. recovered sand with no shows. On an elevation of 398 ft., electric log tops were: Selma 1,797 ft., Eutaw 2,664 ft., Tuscaloosa 3,242 ft., Massive 3,880 ft., Lower Cretaceous 3,980 ft.

In Clay County, 2½ miles east of Tibber, Atlantic Refining Co. 1 R. G. Dunning, NW SW 12-19n-16e, Clay County, was drilling below 4,600 ft. after a delay from lost returns around 4,470 ft. Top of the Pennsylvanian was found at 1,710 ft., on an elevation of 184 ft.

MISSISSIPPI WILDCAT FAILURES

Jefferson County: E. E. Fogelson et al 1 Jefferson County Bank, 4-9n-2e, dry, TD 10,120 ft., Selma 8,136 ft., Austin 8,670 ft., Tuscaloosa 9,128 ft., Marine 9,654 ft., elevation 267 ft.

Yazoo County: Slick Oil et al 1 Lester Ingram, NE NW 29-12n-1w, dry, TD 7,010 ft., Wilcox 1,955 ft., Midway 4,073 ft., Selma 5,048 ft., Eutaw 5,970 ft., Tuscaloosa 6,636 ft.

TENNESSEE

In McNairy County, Stephens Petroleum's wildcat, the 1 Petree, northeast of Michie on Highway 22, was drilling ahead below 4,210 ft. in sand and was expected to make a commercial gasser. Sand samples from 4,085-95 ft. had a slight show of black oil under a fluoroscope. Operators planned to plug back, set casing, and test the Knox dolomite gas sand at 4,026-29 ft. if no further shows are found.

ILLINOIS

Two Promising Wildcats North of Bible Grove Pool

JUST north of Elliottstown, and about 6 miles north of the Bible Grove pool, Gulf Refining Co. 1 Schultz, SW SW NW 32-7n-7e, Effingham County, has set pipe through saturation found in the Rosiclare from 2,730-38 ft. Total depth is 2,884 ft. A drill-stem test at 2,724-40 ft. was free of water and recovered 40 ft. of oil and 390 ft. of oil-cut mud. The elevation of the well is 567 ft., and formation tops were logged as follows: Glen Dean 2,282 ft., Barlow 2,465 ft., Benoist 2,602 ft., Ste. Genevieve 2,718 ft., and McClosky 2,775 ft.

About 3 miles north of Bible Grove pool, Gilliam and Aspin 1 Adams, SW NW SE 10-6n-7e, Effingham County, is rated at 102 bbl., after acidizing the McClosky at 2,868-72 ft. with 6,000 gal.

In Perry County, about 10 miles south of the McKinley pool and approximately the same distance east of the abandoned Sparta gas pool, Chicago Petroleum Corp. has made location in NW NE NW 22-5s-4w for its 1 Thompson.

ILLINOIS SUCCESSFUL WILDCAT

Effingham County: Gilliam and Smith 1 Adams, SW NW SE 10-6n-7e, I.P. 102 bbl., 5-in. 2,866 ft., 6,000 gal. acid, Rosiclare 2,832 ft., Fredonia 2,852 ft., McClosky 2,868-72 ft., TD 2,879 ft.

ILLINOIS WILDCAT FAILURES

Fayette County: John Powell et al 1 Murray, SE SW NE 32-4n-1w, dry at 1,416 ft., Glen Dean 1,092 ft., Cypress 1,241 ft., Benoist 1,388 ft.

Gallatin County: Sohio Oil Co. 1 Suttner, SE NE NE 23-8s-8e, dry at 2,890 ft., Menard 1,884 ft., Tar Springs 2,056 ft., Cypress 2,444 ft., Aux Vases 2,797 ft., Ste. Genevieve 2,803 ft., McClosky 2,862 ft.

Jasper County: George Wrather 1 Miller, SE SE SW 10-5n-9e, dry at 3,195 ft., Menard 2,322 ft., Glen Dean 2,507 ft., Paint Creek 2,883 ft., Renault 2,992 ft., McClosky 3,133 ft.

Lawrence County: Hagerman Properties, Inc., 1 Loakman, NW NE SE 18-3n-10w, dry at 1,933 ft., Glen Dean 1,443 ft., Barlow 1,594 ft., Benoist 1,686 ft., Renault 1,750 ft., Ste. Genevieve 1,817 ft.

Richland County: Sam Malis 1 Henry Leist, NE NE NW 24-2n-14w, dry at 3,025 ft., elev. 485 ft., Glen Dean 2,410 ft., Barlow 2,506 ft., Ste. Genevieve 2,921 ft., and McClosky 2,957 ft.

Wabash County: Sharp 1 Aukenbrandt, NW NW SE 5-1s-13w, dry at 2,803 ft., Menard 1,933 ft., Golconda 2,290 ft., Paint Creek 2,518 ft., Ste. Genevieve 2,690 ft.

P.E.S.A. Plans May 4-7 Meeting in San Francisco

Preliminary arrangements have been completed for the annual meeting of the Petroleum Equipment Suppliers Association which will be held at the Mark Hopkins and Fairmont hotels, San Francisco, May 4-7.

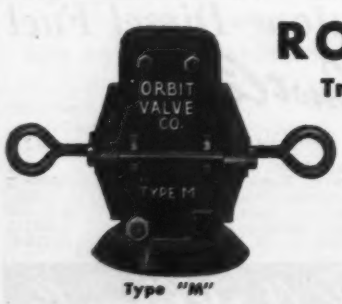
Hugh R. Glen, president of Emsco Derrick & Equipment Co., and president of the P.E.S.A., heads an arrangements committee which is composed of California leaders in the supply and equipment industry, according to an announcement by H. R. Safford, Jr., executive secretary of the association. The final program is to be announced soon.

Approximately 300 are expected to attend the meeting. Besides special business meeting, the agenda will include election of new officers and directors of the organization, plans for future activities, and discussion of association finance and policies.

Cities Service Drops Proposed Rate Plan

WASHINGTON.—The Federal Power Commission has allowed Cities Service Gas Co. to withdraw a proposed rate schedule which would have required its affiliated customers, Gas Service Co., Kansas City Gas Co., and Wyandotte County Gas Co., to take their entire gas requirements excluding minor local production from Cities Service for a period of 25 years.

The proposed rate schedule was suspended by the commission in January 1946 pending a hearing. The schedule was later consolidated for hearing with several applications filed by the company requesting authority to construct additional facilities. March 12, 1947, Cities Service filed a request to withdraw without prejudice its proposed schedule.



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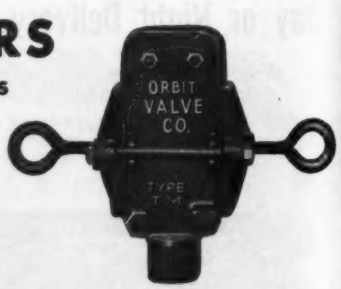

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New locations in March indicate Carter, Hughes, Seminole, Stephens, and Texas counties were also conspicuously active.

In Carter County, where 27 locations were made, March completion depths indicate 40 per cent of the wells are currently completed shallower than 2,000 ft.; about 44 per cent are completed between 2,000 and 4,000 ft.; about 10 per cent between 4,000 and 5,000 ft., and an occasional well below 5,000 ft.

In Hughes County where 50 locations were made in March, completion depths currently show about 13 per cent shallower than 2,000 ft.; 50 per cent from 2,000 to 3,000 ft.; and 37 per cent from 3,000 to 4,000 ft.

In Seminole County where 36 locations were made in March, 7 per cent of the recent completions are at depths of 2,000 to 3,000 ft.; 78 per cent between 3,000 and 4,000 ft.; and 15 per cent at 4,000 to 5,000 ft.

In Stephens County, where 32 locations were reported, drilling depths vary widely, current completions indicating about 11 per cent less than 2,000 ft.; 30 per cent between 2,000 and 4,000 ft.; 22 per cent between 4,000 and 5,000 ft.; 26 per cent between 5,000 and 6,000 ft.; and 11 per cent over 6,000 ft.

Hugoton field gas wells in Texas County keep that county in the active list; 27 locations being made in March. Practically all completions are at depths between 2,700 and 3,000 ft.

Gray Hill Drilling Co. will drill its 2 Wetselline, in SW NE NE, 34-6n-12w, Caddo County, Oklahoma.

Norman Hardin, Bovaird Supply Co.; B. G. Kegley, tool pusher for Goodpaster Drilling Co.; Vernon Hays, superintendent, Lion Oil Co.; O. E. Owens, toolpusher for Ruso Drilling Co., and Gentry Adams, Bovaird. Picture taken in Pratt, Kans.

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Godfrey Drilling Co. has been awarded contract on the W. F. Kejlet 1 Elizabeth J. Olson, in NE NE SW 28-1n-16w, Allegan County, Michigan.

Gilger Drilling Co., Ltd., Houston, has been granted contract to drill Joe W. Brown 1 Valentine in the Valentine pool, Lafourche Parish, Louisiana, 46-17s-20e. Contract depth is 10,000 ft.

Baker & Taylor have contract on Sun Oil Co.'s fifth operation in the Jameson field of northwestern Coke County, West Texas. This test, the 2 Allen Jameson, in Section 253, Block 1-A, H&TC Survey, will go to 7,500 ft.

Union Drilling Co. will drill the Sohio Petroleum Co. 2 Dr. Fred Douglass, in SE NE SE 4-12n-8w, Montcalm County, Michigan.

Meredith, Clegg & Hunt, Houston, have completed King Ranch-Paso Ancho 88 as a producer for Humble Oil & Refining Co. and have moved and spudded in on same company's Paso Ancho 85. Contract depth is 7,200 ft. These wells are located in Stratton field of Kleberg County, Texas.

Jackson Drilling Co., Duncan, Okla., was starting at the 1 Bullard, in NE NE NE 34-1s-8w, Stephens County, Oklahoma. The test was scheduled to go to 2,500 ft.

Charlie Grace will drill Continental Oil Co. 1 Shawver, a wildcat 2½ miles northeast of Perrin, in Jack County, North Texas. Contract depth is 5,500 ft.

Voorhees Drilling Co. has the contract to drill the Ervin Major and Fred Riddell 4 Clark-Lurvey Comm., in SE NE NW 33-10n-7e, Tuscola County, Michigan.

J. R. Hatch has drilling contract on the Seaboard Oil Co. and Shamrock Oil & Gas Co. 1-C University, in Section 45, Block C of University Lands, Hudspeth County, West Texas, and was moving in rotary tools.

Delta Drilling Co., Tyler, Tex., has been awarded contract for Chicago Corp. 1 Morris, a wildcat in the E. A. Smith Survey, 4 miles south of Henderson, in Rusk County, East Texas. It will be a Travis Peak test and is located approximately 1 mile south of Delta and Chicago's 1 Rayford, which was said to have made some gas and distillate before being abandoned last year.

Britton & Corbett are drilling contractors on the Globe Oil & Refining Co. and Vickers Petroleum Co. 1 Carr Community, in NE NE SE 29-3n-2w, Garvin County, Oklahoma, Bromide sand discovery prospect on the east side of Southwest Antioch pool. Stained sand with good porosity and taste of oil has been drilled from 7,757-85 ft. Sunray Oil Corp. owns half interest in the well.

Scott Drilling, Inc., is contractor on the Scott Drilling, Inc., and H. E. Bell 1 C. K. Eddy & Sons, in NW NW SE 3-15n-6w, Isabella County, Michigan.

Westcott Drilling Co. has contract for the S. D. Butcher and associates gas well to be drilled on land of the Panhandle Agricultural College, near Goodwell in Texas County, Oklahoma. The well will be drilled in the approximate center of Section 36-2n-

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13ecm. Westcott will also drill a well for J. M. Kessler, Leo Portman, and Kenneth Ellison, in NE NE SW 31-4n-14 ecm.

Union Drilling Co. will drill on contract the C. E. Weller 1 State-Newkirk, in 16-20n-12w, Lake County, Michigan.

Northern Development Co., of Edmonton, Alta., is completing S.A.C. 5, NW LSD 1, 2-49-28w3, in the Saskatchewan section of Lloydminster field.

Ralph Lowe, Midland, Tex., has contract to drill Jergins Oil Co.'s first test in the Permian basin. The operation will be the 1 Parmer County fee, located about 7 miles northeast of the Means field, in northeast Andrews County. Contracted depth is 5,500 ft. Jergins is a Long Beach, Calif., operator.

J. & L. Drilling Co., of Lethbridge, Alta., has contracts for exploration work for California-Standard in various southern Alberta areas, and has purchased a building in North Lethbridge for storage purposes.

Grace Drilling Co., Houston, has spudded in at 11 South Coast for Fifteen Oil Co., Charenton pool, St. Mary Parish, South Louisiana. This test is located in 31-13s-10e, and is projected to 8,500 ft.

G. H. Neighbors has drilling contract on the J. F. Lent 1 Whatley, in NE 20-10n-10w, Natchitoches Parish, North Louisiana. Location is 6 miles east of Pleasant Hill. The test will go to 3,500 ft.

James L. White and **Robert J. Milligan** have contracted to drill a gas test for Richard Cunningham, on the John Shannon heirs' 160-acre tract, I. F. Rosseau Survey 14, east of Brownwood, in Brown County, West Central Texas.

Hislop Construction Co. is erecting derrick for Gulf Oil-Pincher Creek 1, LSD 15, 24-3-29w4, deep test to be drilled in the Pincher Creek area of southwestern Alberta. **Parker Drilling Co.** of Tulsa has contract for the well, which is to be carried to 13,000 ft. if necessary.

George Cooper holds the contract to drill the R. A. King 1-A J. J. Perkins, in southwest of Section 2, SPRR Survey, Archer County, Texas. Location is 2½ miles west of Holliday. The wildcat is contracted to 5,200 ft.

O'Rourke Drilling Co. has been granted charter by the Oklahoma secretary of state. The firm will headquarter in Tulsa, Capital is $100,000, and incorporation papers were filed by D. F. O'Rourke, L. W. Baker, and Otho Flippo.

W. R. McMaster, drilling contractor, formerly of Caledonia, Ont., is preparing to resume drilling operations for Gaspe Oil Ventures, Ltd., of Montreal in the Gaspe district of Quebec. Owing to the difficulty of winter drilling, Ventures 1 well has been shut down at 2,207 ft., after striking gas last December at 1,992 ft. C.P.L. 1 will resume from 2,160 ft., having last year completed a successful cementing job at 2,137 ft.

Independent Exploration Co. last week announced expansion plans for its Fort Worth office, which serves North and West Texas, and the Rocky Mountain states. John H. Wilson will continue in charge of all operations in these areas, as vice president. George H. Harrington, Jr., has been transferred from Houston to become assistant manager in charge of gravity-meter surveys. Spencer R. Norman is office manager. New headquarters are now in the Electric Building.

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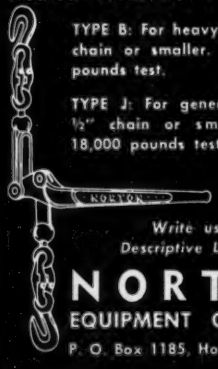

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TYPE J: For general hauling—½" chain or smaller. Over 18,000 pounds test.

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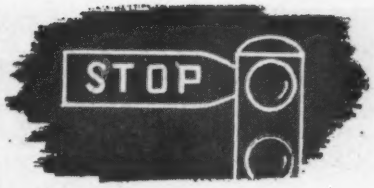

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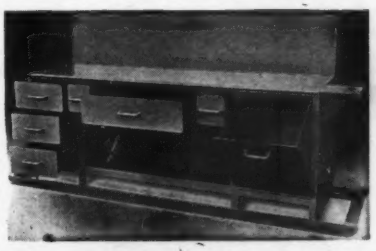

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HOUSTON TEXAS

STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED APRIL 5, 1947

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1947				
	Comp.	Oil	Gas	Dry	Footage	1947	1946	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	21	11	0	*10	30,475	358	412	0	0	0	0	0	3	0	0	2	5
Pennsylvania¶	51	25	4	†22	83,283	825	1,084	0	0	0	0	0	0	0	0	0	0
West Virginia¶	8	2	5	1	25,024	215	184	0	0	0	0	0	0	0	0	0	0
Ohio	26	5	12	9	74,289	319	284	0	0	1	1	2	0	0	2	15	17
Indiana	14	5	1	8	26,370	134	72	0	0	0	0	0	3	0	0	11	14
Kentucky	14	6	3	5	22,723	120	110	2	0	0	1	3	4	0	0	10	14
Illinois	40	24	0	16	105,783	474	522	1	0	0	6	7	17	0	0	73	90
Michigan	8	3	0	5	16,275	159	167	1	0	0	1	2	2	0	3	58	63
Kansas	49	27	8	14	163,744	666	532	0	0	1	4	5	11	0	7	70	88
Neb., Mo., Iowa	0	0	0	0	0	2	5	0	0	0	0	0	0	0	0	2	2
Oklahoma	83	46	2	35	239,836	1,074	633	1	1	0	17	19	22	1	2	200	225
Texas	156	94	11	51	713,742	2,126	2,065	4	0	1	21	26	72	13	19	329	433
North Central (Dist. 7B & 9)	57	29	1	‡27	179,959	657	697	2	0	0	9	11	31	0	5	118	154
West (Dist. 7C & 8)	29	25	1	3	140,265	509	448	0	0	0	1	1	6	0	2	39	47
Panhandle (Dist. 10)	9	4	5	0	28,700	122	101	0	0	0	0	0	1	0	0	0	1
Eastern (Dist. 5 & 6)	7	2	2	§3	41,113	117	193	0	0	0	1	1	1	0	1	28	30
Gulf Coast (Dist. 3)	28	21	1	6	177,556	413	484	0	0	1	2	3	16	8	9	66	99
Southwest (Dist. 1, 2 & 4)	26	13	1	12	146,149	308	142	2	0	0	8	10	17	5	2	78	102
Louisiana	25	14	1	10	154,161	294	339	0	0	0	5	5	11	6	2	40	59
Northern	15	7	1	7	59,289	146	173	0	0	0	2	2	0	0	0	22	22
Southern	10	7	0	3	94,872	148	166	0	0	0	3	3	11	6	2	18	37
Arkansas	6	3	0	3	25,525	60	48	0	0	0	1	1	0	0	0	9	9
Mississippi	5	2	0	3	33,844	87	66	0	0	0	2	2	0	0	1	22	23
Southeastern States	0	0	0	0	0	13	12	0	0	0	0	0	0	0	0	11	11
Montana	0	0	0	0	0	39	62	0	0	0	0	0	0	0	0	8	8
Wyoming	1	0	0	1	3,720	54	47	0	0	0	1	1	4	0	1	11	16
Colorado-Utah	4	3	0	1	20,470	43	31	0	0	0	1	1	1	0	0	8	9
New Mexico	11	7	2	2	63,337	137	105	0	0	0	2	2	2	0	1	12	15
California	41	28	2	11	173,509	489	491	0	0	0	11	11	5	0	0	80	85
Total United States	563	305	51	207	1,976,110	7,688	7,271	9	1	3	74	87	157	20	38	971	1,186
Total previous week	568	311	55	202	1,944,277	7,125	6,730	9	2	3	65	79	148	19	35	897	1,099
Total April 6, 1946	541	318	42	181	1,879,892	....	....	5	1	3	53	62	122	11	31	819	983

Service wells included: *10, †22, ‡2, §1. ¶Wildcat cumulative totals corrected.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.40	....	....	....
19-19.9	1.45	....	....	....
20-20.9	1.49	$1.55	....	$1.42
21-21.9	1.53	1.57	....	1.44
22-22.9	1.57	1.59	....	1.46
23-23.9	1.60	1.61	....	1.48
24-24.9	1.64	1.63	$1.86	1.50
25-25.9	1.68	1.65	1.88	1.52
26-26.9	1.71	1.67	1.90	1.54
27-27.9	1.75	1.69	1.92	1.56
28-28.9	1.79	1.71	1.94	1.58
29-29.9	1.82	1.73	1.96	1.60
30-30.9	1.86	1.75	1.98	1.62
31-31.9	....	1.77	2.00	1.64
32-32.9	....	1.79	2.02	1.66
33-33.9	....	1.81	2.04	1.68
34-34.9	....	1.83	2.06	1.70
35-35.9	....	1.85	2.08	1.72
36-36.9	....	1.87	2.10	1.74
37-37.9	....	1.89	2.12	1.76
38-38.9	....	1.91	2.14	1.78
39-39.9	....	1.93	2.16	1.80
40 and above	....	1.95	2.18	1.82

*For crude from Daboval, El Campo, and Sandy Point. †Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT, WEEK ENDED MARCH 29

District—	Crude runs, daily avg.	Production				Stocks at refineries, bulk terminals, in transit and in pipe lines			
		Gasoline†	Kerosene	Gas & dist. oil	Residual	Gasoline*	Kerosene	Gas & dist. oil	Residual
East Coast	793	1,816	195	1,211	1,874	22,911	4,341	9,149	6,189
Appalachian:									
Dist. 1	104	292	57	91	98	2,771	194	340	234
Dist. 2	55	193	10	52	115	949	24	65	91
Ind., Ill., Ky.	805	2,564	299	908	1,029	22,760	1,120	2,420	1,891
Okla., Kans., Mo.	398	1,414	208	443	448	10,959	351	1,171	896
Inland Texas	210	950	111	106	338	4,500	176	313	721
Texas Gulf	1,079	3,289	624	1,663	1,672	15,402	1,585	5,843	5,304
Louisiana Gulf	371	1,043	379	414	448	5,445	725	1,968	1,395
N. La. & Ark.	63	178	51	49	107	2,020	187	430	119
Rocky Mountain:									
New Mexico	10	33	4	8	22	88	16	33	39
Other	119	369	16	153	221	3,203	46	484	682
California	836	2,255	110	861	2,296	16,568	807	10,521	25,803
March 29, 1947	4,843	14,396	2,064	5,959	8,668	107,576	9,572	32,737	43,364
March 22, 1947	4,885	14,440	2,125	5,968	8,621	106,526	9,872	32,993	42,703
March 30, 1946	4,692	13,420	2,045	5,496	8,592	104,297	9,081	29,615	37,661

Figures are in 1,000 bbl. 42 gal. each. They include reported totals plus an estimate of unreported amounts and are therefore on a Bureau of Mines basis.
*Finished and unfinished. †At refineries including natural blended.

FLAT CRUDE PRICES

Representative posted schedules per bbl.		Illinois Basin	2.07
East Texas	$1.95	Pecos County, Texas (Yates)	1.65
Kettleman Hills, California*	1.94	Bradford, Pennsylvania	3.91
Beauregard Parish	1.90	Eastern Ill. and Western Ind.†	2.07
		Tomball, Texas Gulf Coast	2.10

*37°-37.9°. †35° and above.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	Apr. 5 crude oil	B. of M. Mar. demand	Mar. 29 crude oil
Alabama	1,300	1,200	1,000
Arkansas	80,100	79,000	79,900
California	907,000	850,000	906,400
Colorado	38,150	38,000	37,560
Eastern	61,500	64,200	64,500
Florida	600	200	650
Illinois	184,100	210,000	190,900
Indiana	18,300	18,000	18,000
Kansas	276,450	270,000	281,150
Kentucky	27,200	29,000	27,400
Louisiana	414,205	400,000	414,000
North Louisiana	101,600	.....	102,550
South Louisiana	312,605	.....	311,450
Michigan	43,045	47,000	44,230
Mississippi	86,840	77,000	87,245
Montana	21,480	24,000	22,480
Nebraska	650	700	650
New Mexico	103,155	101,000	103,900
Oklahoma	379,250	375,000	370,400
Texas	2,150,545	2,060,000	2,129,750
District 1 (Southwest)	20,664	.....	20,550
District 2 (Southwest)	157,957	.....	157,900
District 4 (Southwest)	241,971	.....	242,000
District 3 (Gulf Coast)	483,443	.....	487,300
District 5 (Eastern)	38,147	.....	38,290
District 6 (Eastern)	111,284	.....	110,995
East Texas field	325,571	.....	313,000
District 7-C (West)	35,697	.....	34,890
District 8 (West)	480,710	.....	473,725
District 7-B (W. Central)	36,768	.....	36,425
District 9 (N. Central)	133,543	.....	130,000
District 10 (Panhandle)	84,790	.....	84,675
Wyoming	106,780	100,000	107,890
Miscellaneous	.....	700	.....
Total United States	*4,900,650	4,745,000	4,888,005

Change from prev. week, up 12,645

Total production January 1-April 5 ..... †455,360,410 bbl.

Same period last year (crude plus condensate).. 441,513,900 bbl.

*Not incl. 27,190 bbl. condensate. †Incl. 2,438,410 bbl. condensate.

CRUDE-OIL STOCKS 227,529,000 bbl. as of March 29—up 1,809,000 bbl. One year ago 224,994,000 bbl.

GASOLINE STOCKS 107,576,000 bbl. as of March 29—up 1,050,000 bbl. One year ago 104,297,000 bbl.

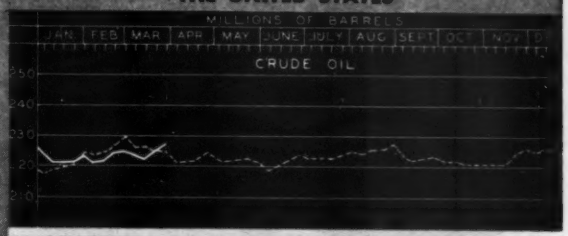
RESIDUAL FUEL-OIL STOCKS 43,364,000 bbl. as of March 29—up 661,000 bbl. One year ago 37,661,000 bbl.

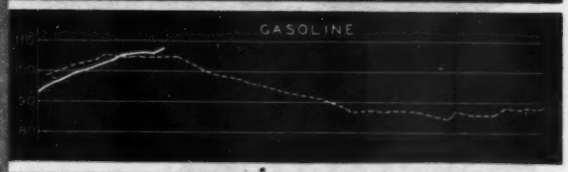
GAS OIL AND DISTILLATE STOCKS 32,737,000 bbl. as of March 29—down 256,000 bbl. One year ago 29,615,000 bbl.

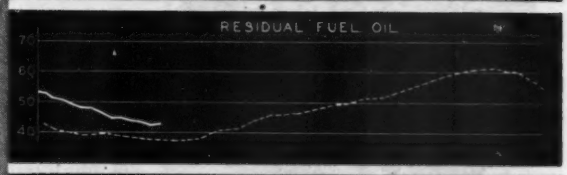
CRUDE-OIL PRODUCTION 4,900,650 bbl. as of April 5—up 12,645 bbl. One year ago 4,443,640 bbl.

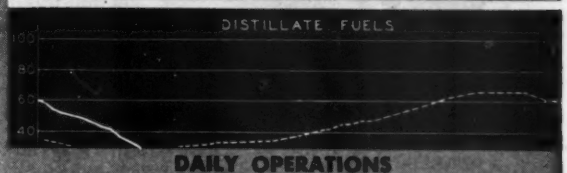
REFINERY RUNS 4,843,000 bbl. daily week ended March 29—down 42,000 bbl. One year ago 4,692,000 bbl.

OIL STOCKS IN THE UNITED STATES

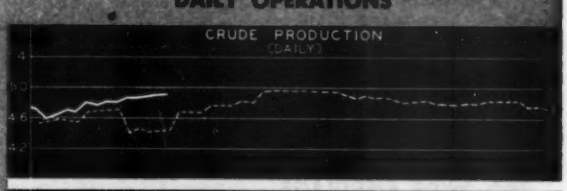


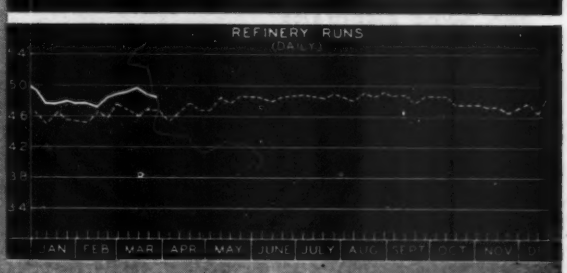




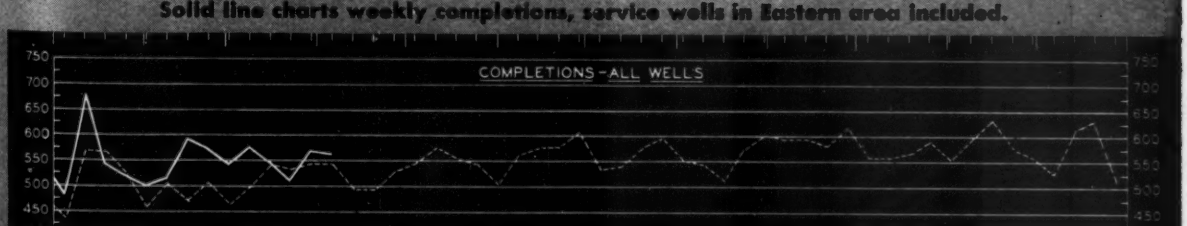


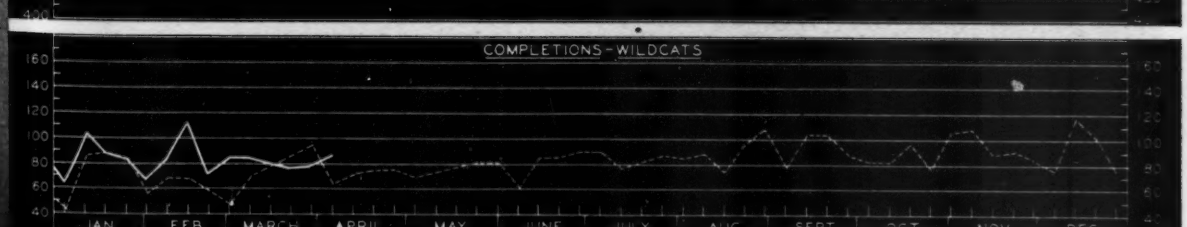
DAILY OPERATIONS





Solid line charts weekly completions, service wells in Eastern area included.





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MARKETS

A STRONG demand for all petroleum products, emphasized by new postwar record prices for residual fuel oil and coupled with a continuing shortage of tank cars, characterized marketing operations in the Mid-Continent and Midwestern areas early this week.

Warmer weather brought a visible drop in the demand for light burning oils and saw the supply of those classes improve, while delayed rail shipment, brought about by the continuing tank-car shortage, allowed little improvement in deliveries, with the market remaining firm.

Prices on residual fuel oil were running on a par with prices for crude, with one refiner reporting a 20,000-bbl. sale at $1.95. The new coal strike and continued uncertainty of coal production were cited as the principal reasons for the strong market for this product, with steel companies and other manufacturing firms setting the buying pace in an effort to guarantee a fuel supply. Immediate delivery was being sought by most buyers.

Natural Gasoline Firm

The tight market in gasoline helped support a firm natural gasoline price, and natural-gasoline dealers predicted a continuing strong market throughout the coming season.

Gasoline, itself, remained in heavy demand. Although stocks of gasoline increased during the week, slow rail movement of the product was being given a large share of the responsibility for the gain. One refiner, who said his deliveries are 2 weeks behind orders, said his stocks of gasoline would be depleted overnight if sufficient tank cars suddenly were made available.

Increased demand for kerosene was reported taking up the little slack created by a slight drop in demand for the top burning oils. North Texas refiners attributed the added kerosene demand to its use as tractor fuel in the Midwest and northwestern farming areas and to a new use in the Rio Grande Valley to kill mesquite.

In Dallas some refiners said they anticipate no further increases in products prices in the near future, with the current market expected to continue with little change. Current products prices, they believe, are at a maximum.

Rail Improvement Slow

In the field of rail transportation, tank-car suppliers reported no improvement generally, but pointed to a slight loosening up in scattered points, particularly in Texas. Any marked development which would aid products handlers was expected to be gradual and over an extended period.

In New York the residual supply was reported still tight, although stocks were improved. There was very little activity there for No. 2 and kerosene, with kerosene reported tighter than No. 2. Prices at New York Harbor were holding for all products.

In eastern Canada, Imperial Oil, Ltd., announced an advance of ½ to 1 cent a gallon in the price of fuel and burning oils as a result of the general 25-cent crude increase in the United States in March. The company also announced it has begun movement of 12,000 bbl. of crude oil daily from Venezuela to supplement supplies for its plant at Sarnia.

Representative Quotations

Representative spot-market quotations of leading suppliers as of last Monday. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel.

GASOLINE, KEROSENE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor	Texas Gulf Coast
Regular gasoline, 73-75 octane	8-8.5	10.1-10.4* 9.2- 9.4†	7.75-8
Premium gasoline, 78-80 octane	8.75-9.5	10.2-12	8.5 -9
42-44 w.w. kerosene	6.75-7	7.8	6.75-6.875
No. 2 straw fuel oil	6.125-6.5	6.8-6.9	5.5-5.75
No. 6 residual	$1.80-1.95	$2.22	$1.55-1.70

*Branded (74-76 octane); †Unbranded (74-76 octane).

NATURAL GASOLINE

	Group 3	North Texas	N. La.*
Grade 26-70	5.375	4.875	5.125
Grade 18-55	6.45	5.85	6.15

LUBRICATING OILS

Mid-Continent

150-160 vis. D bright stock, 0-10 p.p.	29
200 vis. No. 3 neutral, 0-10 p.p.	19

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	11-12.5
750 vis., No. 3-4 neutral	13-15.25
2,000 No. 5-6 neutral	14.5-16.75

Western Pennsylvania

145-155 vis. 10 p.t. bright stock	40
180 vis. 0 p.t. neutral	42

*Same quotation prevailed previous week.

Equipment Men in the News

Unit Rig Involved in Corporate Changes

Unit Rig & Equipment Co., Tulsa, formerly a partnership composed of J. R. Underwood, H. S. Chancey, William Guier,

WILLIAM GUIER

R. E. CARTER

and R. E. Carter, was dissolved by the death of Underwood in May 1946. In the settlement of the Underwood estate, the company went through a friendly receivership and was subsequently sold on April 1, 1947, in District Court in Tulsa. The company was acquired by the Unit Rig & Equipment Co., Inc., a Delaware corporation, whose personnel is made up principally of former partners in the old company. The officers are William Guier, president; R. E. Carter, vice president, and F. C. Morton, secretary-treasurer. The new corporation purchased the interests of H. S. Chancey, and of Mrs. Jennie Underwood, executrix of the Underwood estate.

The company has been active in the manufacture and sale of drilling and well-servicing equipment for the past 10 years. The plant facilities have been expanded from time to time in keeping with the demand for this equipment and more than 200 skilled workmen are employed at the present time. It is expected that the new company officials will expand it further to accommodate their new line of servicing equipment and new additions to the drilling line to be announced in the near future. The offices of the company are on the fourth floor of the Kennedy Building, Tulsa, and the plant is located at 324 West Archer.

Briggs Appoints Bennett

The appointment of Dale L. Bennett as midwestern zone manager of Briggs Filtration Co., Bethesda, Md., is announced by Chase Donaldson, president. Bennett will supervise the promotion of industrial oil filters in his district from headquarters in Chicago.

Timken-Detroit Axle Names Parker & Hayes

Fred. W. Parker has been appointed assistant to president of Timken-Detroit Axle Co., is was announced by President Walter F. Rockwell. Succeeding Parker as director of service is Kenneth P. Hayes. His organization will include the following service divisional managers: John L. Kermath, parts sales manager; O. E. Johnson, field sales manager; Daniel Celluci, field service manager, and Jack Neph, assistant field service manager.

Pennsalt Names Tomlinson Plant Superintendent

Ritner W. Tomlinson has been appointed superintendent of the Easton, Pa., plant of Pennsylvania Salt Manufacturing Co., according to an announcement by Claude S. Beldin, production manager. Tomlinson previously was plant superintendent at Cornwells Heights, Pa., and the Greenwich plant in Philadelphia.

Bynum and Reed Appointed

J. A. Bynum, who has been district sales manager for Reading-Pratt & Cady Division of American Chain & Cable Co., Inc., in the Southwest for many years, has been appointed special representative on Reading-Pratt & Cady valves for the petroleum industry in that area. J. J. Reed has been appointed district sales manager to suc-

(Continued on page 153)

Transmission Machinery Corp. of Dallas Announces Full-Scale Operation of New Foundry and Plant

Located on a 3¼-acre site at 2945 Ash Lane, Dallas, "Transco" is in full operation. Transmission Machinery Corp. is headed by Hugh B. Williams, president; C. G. Unlaub, vice president; J. D. Brance, vice president, and T. E. Green, secretary and treasurer.

The corporation was formed in 1945 and originally planned to manufacture that part of the sheave range required in the Mid-Continent area, but the new plant has been expanded to take care of practically all sizes and types of sheaves. The plant includes a pattern shop, foundry, machine shops, and warehousing facilities and is unique in that it is the only manufacturing operation in this part of the country which has been designed and set up entirely for sheave manufacture. The foundry is pouring only a high-tensile close-grained semi-steel, and has set a record for consistent quality entirely due to a high degree of mechanization. Output is totally absorbed in sheave production but capacity will eventually be raised to provide surplus for high-quality castings on volume items.

Sheaves manufactured include BoltRim, QD, and solid-hub specials. The QD sheaves are made under Worthington license and standard specifications. Transco sheaves and Goodrich V-belts are carried in stock by Southwest jobbers and distributors.

Accompanying views show aerial view of plant, shipping department, and foundry.

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads except Situations Wanted, 10 cents a word. Minimum charge, $2.00 per insertion.
Situations Wanted ads, 5 cents a word. Minimum charge, $1.00 per insertion.
Centered Line, any ad, 75 cents.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$9.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

SPUDDER—Fort Worth Spudder D located on siding in Tulsa. Travco Equipment Co., 110 Midco Bldg., Tulsa, Oklahoma. Phone 5-2251.

FOR CABLE TOOLS
see
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: 1—Wichita 66 Spudder, 1—Le-Roi engine, tools from 15½ to 7 inch. Kohler light plant outfit complete. Priced to sell. Phone 589, Walter A. Hale, P. O. Box 2437, Cut Bank, Montana.

FOR SALE: Pumping Units. All types & sizes. New and used. Bridgeports, Jensens, Americans, Atlas, Ideco, with or without Power. Glenn Supply Co., 3600 Sand Springs Road. Phone 3-9607, Tulsa, Okla.

FOR SALE: Two (2) four-wheel drive seismograph or core drill water trucks, mounted on 4x4 Army trucks. Approximately 450 gal. capacity tanks. Equipped with winch and tool boxes. Box B-654, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT FOR SALE

FOR SALE: Six New Kobe, 2½ inch tubing insert, pumps, one Triplex—Bargain for immediate sale. Ben Beckham, Jr., Box 134, Overton, Texas. Phone 3921.

LUMBER FOR SALE: 3x6 and wider 10 to 16 rough Oak $58.00 f.o.b. mill. E. J. Galennie, Lumber, Box 1074, Shreveport, Louisiana.

FOR SALE: Bucyrus-24L Spudder, complete. Steel dog house, Kohler Light Plant, tools, & lines. Capable of drilling 2000 ft. Price $4750.00. Blalack & Walter Drilling Contractors, Mt. Vernon, Illinois. Phone 2451.

FOR SALE: Casing pulling unit with 6 cylinder International motor on skids, sand line drum double cathead, 6 cylinder thrift pump, 5½" telescope jacks 4½' lift, steel mast pole, cat line and Wilson tongues, capable of pulling any depth well. Address P.O. Box 214, Henderson, Kentucky, or phone 2376 after 6 o'clock.

FOR SALE

12—230 H. P. Bessemer and Clark horizontal Engines with new 17" Power Heads complete with compressors in first-class condition.

ENGLE PETROLEUM, INC.
P. O. Box 72
MT. CARMEL, ILLINOIS

WIRE ROPE

Brand New—On Original Reels
450,000 Ft. Hemp Center

254,400 ft.—¼"—6x7 High Grade Plow Steel Galv. Preformed.
160,000 ft.—¾"—6x37 Improved Plow Steel Preformed.
15,000 ft.—⅞"—6x12 Plow Steel Galvanized.
6,000 ft.—1¼"—6x37 Plow Steel Galvanized.
19,000 ft.—1¼"—6x37 Plow Steel.
Manufactured by the Nation's leading wire rope companies.
Buy NOW and store for future use.
Write—Wire—Phone

BROWN - STRAUSS CORP.
Box 78 Phone HA. 1000 K. C., Mo.

EQUIPMENT FOR SALE

FOR SALE: Diesel Engine powered rotary drilling rig, suitable for 5,000' drilling. Priced cheap for quick sale. Phone 306. Box 1360, Seminole, Oklahoma.

WELL DRILLING Machines, Spudders, Core drills, Standards. Complete stock cable tools. Used equipment reconditioned Some Government surplus. Pressey & Son, Pueblo, Colorado.

OILFIELD TANDEM TRUCKS
Whites-International-Macks-Misc. full rigged for oilfield work or ideal for mounting heavy units or rigs. G. G. Clayton, Houston, Texas, P.O. Box 1671. Telephone Keystone 3-1361.

FOR SALE: One 7¼ x 10" and one 7¼ x 14" Gardner Denver pumps—overhauled—good condition. Also, one 82 CFT Gardner Denver Air Compressor. Drillers Machine Shop, Box 4532, Oklahoma City 9, Okla., Phone 6-3281.

FOR SALE: Small topping plant, capacity 150 barrels per day; pipe line gathering system and crude available; storage tanks and trucks. Address inquiries to Box B-637, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

Steel Storage Tanks

7—72,600 barrel capacity.
Now on our Tank Farm
near Morgantown, W. Va.

South Penn Oil Co.
Parkersburg, W. Va.

FOR SALE

TUBES and PIPE

all types and sizes

Write, wire or phone for quotations. Also motors, machinery and kindred items.

SONKEN-GALAMBA Corporation
Kansas City, 18, Kans.

FOR SALE — IMMEDIATE DELIVERY

DIESEL ENGINES

2—Winton Model 1920	3 cyl	10"	x 14"	94 HP @	300 RPM
3—Winton Model 1290	3 cyl	12½"	x 16"	120 HP @	250 RPM
9—Winton Model 1580	3 cyl	14"	x 16"	170 HP @	270 RPM
1—Busch 3DF17	3 cyl	13"	x 17"	175 HP @	300 RPM
2—DeLavergne	4 cyl	14½"	x 13"	250 HP @	270 RPM

PUMPS, HORIZONTAL DUPLEX RECIPROCATING

24—Prescott 6" x 24" capy. 20,000 bbls. per day 800#
13—Prescott 4⅝" x 18" 9,000 bbls. per day 800#

GENERATORS, DIRECT CURRENT

21—Allis Chalmers 25 KW 125 Volt Belt Driven
2—Westinghouse 25 KW 125 Volt Belt Driven
9—Allis Chalmers 15 KW 125 Volt Direct connected to Model CSR6 gasoline engine

COMPRESSORS, AIR

8—Ingersoll-Rand, Type 20, two stage, 5" & 2½" x 4", with 7½ HP Allis Chalmers direct current motors

Also water circulating and sump pumps, direct current motors and motor starters ½ to 7½ HP, switch boards and other items.

H. F. SWINDLE
Purchasing Agent, Great Lakes Pipe Line Company
P. O. Box 2239 Kansas City 13, Missouri Phone Grand 2168

HYDRAULIC PUMPS

Aldridge Pump Co. Vertical Triplex HYDRAULIC PUMPS, 2¾" x 8", equipped with Herringbone gears, 67.5 GPM. Maximum pressure for intermittent duty 2,200 lbs., for continuous duty 1,800 lbs. Pump and motor mounted on common bed plate.

Motors are 75 HP, 3/60/220-440 volts, 1740 RPM. Complete with starting panel, consisting of G.E. motor starter switch, push button control, square "D" Switch, and capacitator.

Purchased new 3½ years ago. Excellent condition. Available for immediate delivery.

CONSOLIDATED PRODUCTS CO., INC.
17-20 Park Row, New York, N. Y.